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TERCENTENARY OF THE ROYAL SOCIETY

Sir Cyril Hinshelwood's Presidential Address in full

The Early History of the Society

By Sir Geoffrey Keynes and Michael Hoskin

Prospect of Science Today

By A. B. Pippard, F.R.S., and Denys H. Wilkinson, F.R.S.

The Listener

Vol. LXIV. No. 1634 Thursday July 21 1960 REGISTERED AT THE G.P.O. AS A NEWSPAPER

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Tercentenary of the Royal Society

The Royal Society after 300 Years

By SIR CYRIL HINSHELWOOD, O.M., F.R.S.

The following is the tercentenary address by the President of the Royal Society, which was broadcast in the Home Service

IN the year 1660 the Royal Society was founded. On the scale of cosmic evolution three centuries are as nothing, but by the measure of human life they constitute an impressive span of history. Time in Newton's philosophy flowed uniformly on, but as the matrix of events significant to men it is not measured by the clock. For thousands of millions of years the present galactic cycle has continued, for a few thousand civilization has been spreading round the Earth, and for a few hundred only there has been in progress that rapidly accelerating conquest of knowledge and power over nature which has so largely created the world of today. The foundation of the Royal Society was symbolic of the conscious undertaking of this endeavour. In achievement the 300 years have exceeded all the infinite wastes of evolutionary time: by the scale of human events they are the fullest and longest in all existence. For ourselves, in whom the dramatist can arouse emotion by re-creating the events even of our own brief lifetimes, they have in virtue of their scope an almost epic grandeur. Yet they are short enough to move us in another way. The men who lived in Charles II's reign are still familiar to us as human beings. We can picture in imagination the King himself, and the echoes of his witty sallies have not yet grown faint.

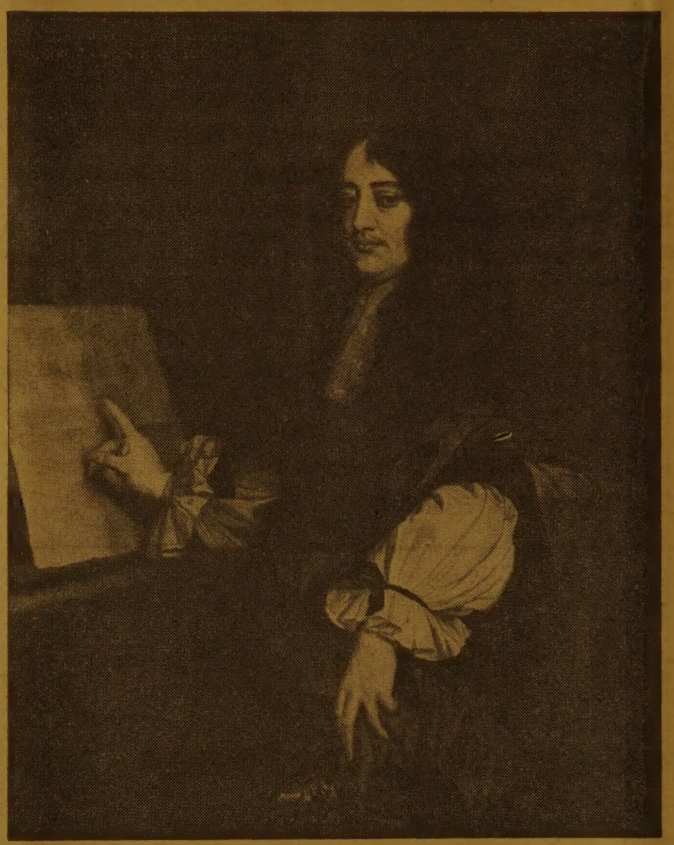
For all the rapid change that continuously dissolves and re-creates the scene of human activity, the men who originated the Royal Society and who are in a sense the fathers of the present age are no further removed from us than our nearer ancestors. Their portraits look down on us, their words remain for us to read, we can feel we know them and have towards them something of a filial piety. We honour them and pay just tribute to them, and our admiration is infused with friendliness and warmth.

What manner of men were they whom we commemorate? At the historic meeting on November 28, 1660, when the idea for the foundation of the Society was propounded, the record states that there were present Lord Brouncker, Mr. Boyle, Mr. Bruce, Sir Robert Moray, Sir Paul Neile, Dr.

Wilkins, Dr. Goddard, Dr. Petty, Mr. Ball, Mr. Rooke, Mr. Wren, and Mr. Hill.

In his diary Evelyn attributes to Brouncker, Boyle, and Moray the credit, if not for the first initiative, at any rate for the furtherance of the project, and for the surmounting of the initial difficulties and disappointments. Brouncker, an Irish peer, had at one time served Prince Charles. He had studied mathematics at Oxford and was later a Doctor of Medicine of that university. He was said to be a good linguist and he made some mathematical discoveries of importance including that of continued fractions. He and John Evelyn, it is related, often discussed scientific questions with the King. He became the first President of the Royal Society.

Robert Boyle, the famous author of *The Sceptical Chymist*, learned in many tongues, devoted the leisure of a great gentleman to a life of study and was renowned not only for his learning but for his piety, his religious and moral writings being probably as numerous as his scientific works. A very different figure was Sir Robert Moray, who combined the qualities of a scholar with those of a man of action. He had served as a soldier under Louis XIII and had been with King Charles in France. After the Restoration he held public offices, enjoyed the confidence of the King, and was described by Huygens as the soul of the Royal Society, to which at various times he made communications on geology, natural history, and comets. He has been spoken of as a chemist and a mathematician and, according to Pepys, was interested in music.



Viscount Brouncker, first President of the Royal Society: a portrait by Sir Peter Lely
From the Royal Society's collection

A man who in the opinion of some deserves to be thought of as the real originator of the Society was John Wilkins, Warden of Wadham College, Oxford, and later Bishop of Chester; wise, tolerant, conciliatory, continuing his work both under Protector and King. He was the central figure round whom gathered the group of learned men which later turned itself into the Society. He had a forward-looking mind, and not only wrote a work on the Moon as a habitable world but composed also a discourse on the possibility of a passage there by 'volitation'.

There are philosophers of history who would maintain that the Royal Society had to come into being when it did, irrespective of individuals, because the climate and temper of the age demanded it. They may be right. It must needs be, perhaps, that such things come, but all honour, nevertheless, to the men by whom the necessity is fulfilled. If the individual does not determine the event he profoundly influences the manner of it. These men, in whom the elements were thus diversely mixed, initiated the humane tradition of the Society, the union of thought and action, the partnership between men of the study and men of the world, which has been maintained throughout its existence; is preserved, we would like to hope, today; and will decide its future.

In illustration of a preconceived thesis the reception of the new Society could be represented in diametrically contrasted manners. Names like Christopher Wren, John Evelyn, Samuel Pepys, and John Dryden bear witness to the width of its appeal. Could we indeed quote anything like so varied a list at the present time? The sympathy of the literary world was not lacking. Addison styled Robert Boyle 'an honour to his country', persons of consequence consigned their sons to the care of Warden Wilkins, and the patronage accorded to the Royal Society by established authority was neither purely formal nor mere lip service. Prince Rupert made communications on his own account. The Earl of Sandwich, sent to escort Catharine of Braganza from Portugal, allowed himself to be set the task of making observations for the Royal Society on the tides and on the saltness of the sea. The King himself was on terms of friendly intimacy with many of the members, often visiting with Sir Robert Moray the laboratory established in Whitehall.

If the illumination is suitably adjusted, however, a less mellow picture emerges. The Warden of Wadham might be a leader of the new movement: Dr. Fell, the formidable Dean of Christ Church, would have none of it. The Public Orator of the University of Oxford declaimed against the Royal Society in the theatre built by Wren, and Antony Wood declared it to be an obnoxious body. Bishop Wilkins, Bishop Ward, and Bishop Sprat might defend the new philosophy with every strength of argument and eloquence, Robert Boyle might write the *Christian Virtuoso*, every protestation and example of piety and orthodoxy might be offered by the Fellows; none of this prevented attacks from the pulpit, and the strangest accusations from other quarters.

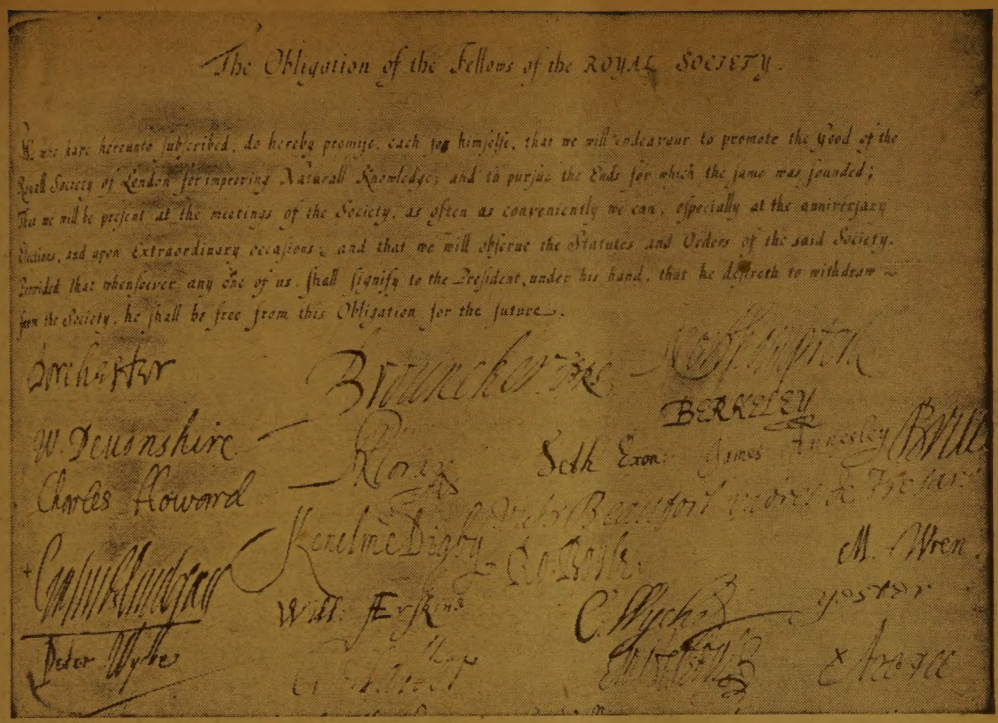
The complaints openly made by the objectors were of atheism, impiety, and subversion, or if not the practice or countenancing of these things then at least the creation of a philosophy which would lead the weaker brethren into evil thoughts or be used by the wicked as a cloak and excuse for their depravities. Besides operating on the side of the godless and corrupting the innocent, the Royal Society was at the same time supposed (though hardly, it may be presumed, by Catholics) to lend itself to popish schemes. It elevated sensual ideals, and it encouraged great expense of spirit in the pursuit of vain truths. It might challenge the authority of the universities and invade the province of the physicians.

Much of this was still reverberating yesterday and even lasts today, and in this respect the three centuries assume perhaps their shortest perspective. In our own time scientific studies have received extravagant praise and intemperate criticism. One great novelist of this century saw the millennium about to be realized through science. Lesser literary figures of the moment have laid every defect or misfortune, from intellectual arrogance to social obscurity, at its door. Every complaint and reproach levelled in the seventeenth century, every fear expressed, every resentment, interested or disinterested, openly or secretly working, can be paralleled in the recent past. Every anxiety, misgiving, criticism, or reserve voiced today has been countered by the seventeenth-century apologists. Nor can the threat of destruction by the release of nuclear energy really have aggravated the issue, for the perils of atomic warfare are at least no more terrible than the prospects of eternal damnation to which many in the earlier age believed the new doctrines were leading men.

If criticism could have restrained or gibes deterred, if any combination of polemic and persuasion could have mollified or silenced, the issue would have been settled once for all. But these strange contests of seemingly incompatible philosophies have periodically renewed themselves, rising to great climaxes like the controversy over evolution in the nineteenth century and the quarrels about the use of nuclear energy in the twentieth. The origin lies more in emotion than in reason: genuine fear of the unknown, reverence for established things, but most of all in the

strangely partisan instincts of men, the manifestation of their combative and yet gregarious nature. What happened after the foundation of the Royal Society was largely a reflection of a permanent or at least a strongly persistent pattern.

But the most significant circumstance is that the attitude of the world at large probably did not seriously determine the course of science. In the seventeenth century the contest was largely a battle of the books. The opponents of the Royal Society did little effectively to hinder it. Nor indeed, after the first flush of enthusiasm, did the majority of its non-scientific or fashionable supporters do much actively to help it. The record of sermons, pamphlets, and other forms of the written word is the raw material of a one-sided story. The literary basis of so much history can easily falsify the perspective. Writers express their views, and other writers, by the natural working of affinity, often attach undue importance to the evidence that these afford. A few dramatists can characterize a whole period as licentious; even resolutions of undergraduate debating societies, if they catch the fancy of the journalists, may help to fix a label on an age. But the future germinates unknown and silently.



Some of the signatures of Fellows on the first page of the Charter Book

From the time of the foundation of the Royal Society onwards there was a steady increase in the number of dedicated men who by the concentration of their minds, the skill of their hands, and the sweat of their brow worked to uncover the secrets of nature. Their labours were largely unknown to their contemporaries, they are but perfunctorily recorded by historians, and yet they have ended by transforming the face of the globe and the life of humanity. The literary battles of the detractors, the satirists, and the apologists had little effect. The men of science lived up to the motto proposed for the Royal Society by Evelyn, *Nullius in Verba*, accepted the authority of none, and were on the whole unmoved by praise or blame.

The nature of things is such that two of the early criticisms of science have refuted one another. It was, some said, too much concerned with material ends: it indulged, according to others, idle curiosity to the good of nobody. The answer today is clear. The technology which has transformed practical existence is largely an application of what was discovered by these allegedly irresponsible philosophers. On the other hand, their shortsighted and earthy preoccupations have entrained an upheaval of the whole of human thought. By what strange workings of destiny does this come about? The propounding of ambitious practical aims seldom leads to their fulfilment. 'Find me a way', an ancient despot might have said, 'to send invisible messages round the world, and I will ennoble and enrich you'. The reward would never have been won. 'Find out', he might less plausibly have said, 'about the strange force in this little piece of amber'. This apparent frivolity contained the secret of his first requirement, but remote and unforeseeable.

The full fruition of scientific work depends upon three things: the desire to know, the initiative to find out, and the awareness to apply. Highly special conditions have to be fulfilled before the plant will bloom, before the flower will fruit, and before the fruit will ripen. Let us have no illusions about one thing. Today we commemorate the doings of a minority and of a small minority. The King himself was a rare figure among the rulers in history. The glamour shed on the Royal Society by his patronage ensured the respect of the eminent but not their subscriptions, and in the year 1700 the corporate income did not exceed about £100.

But if the men of science did not continue to receive much material support they were not for that reason without significance to their time. Who is representative of an age? The acclaim of the day seldom anticipates the verdict of posterity, since the germinal things are almost always hidden or unrecognized. Most conventional history records the waxing and waning of political movements, the course of wars, and the fate of dynastic ambitions. These have been deemed the proper material for polite studies. The adventure and achievements of science have seldom been vouchsafed the attention of the chronicler, nor has their study usually been rated as humane. Yet they have not only transformed the conditions of life but they are the product of human genius, and above all of the determination, sacrifice, and devotion of men, who must on that account be deemed among the foremost representatives of their day.

What, then, have the men of science done in these three centuries? How have they changed the course of history? And these questions raise further ones. Is the change to accelerate further or come to a halt? What does it mean to us? It has brought us face to face with great dilemmas. Can the pursuit of knowledge any longer remain the concern of the few? What, then, shall we do?

After Newton's great synthesis, the law of universal gravitation, the conception of the stellar universe as an ordered mechanism, made possible by Copernicus, Galileo, and Kepler, could no longer be in doubt, and grew in strength with the continuous elaboration of Laplace and his successors. Newtonian mechanics, wedded to the inventiveness of practical men, created modern engineering, and thereby made man largely the master of his environment, bringing him at length to the threshold of extra-terrestrial space. Twentieth-century ideas, largely under the influence of Einstein, imparted a more abstract character to the fundamental notions of space and time, matter and energy. And by a strange paradox of nature it has been one of the most recondite and immaterial of adventures that has led directly to the release of nuclear energy and confronted mankind with one of the greatest practical problems it has ever faced. The obscure and apparently unrelated curiosities of electricity and magnetism were unified at long last into the great body of electromagnetic doctrine. They provided the basis of electrical engineering and electronics by steps too intricate to trace in detail, but of which a crucial one surely was guided by the simple faith of Faraday that these two great natural forces were related. The patient genius with which he pursued his intuition was in its way prophetic, but he had little premonition of electric railways, of television, or of automation.

The not infrequently disreputable operations of the alchemists grew into the science of chemistry. The atomic theory, fruitful after 2,000 years, when experiment had replaced speculation, revealed at last the true secret of nature's elements and compounds, and guided the creation by man of compounds nature

never knew. The stages in the development were complicated, the interrelations and interdependences of ideas and discoveries have been intricate beyond the possibility of any brief description. Contributions might come from any quarter. It would probably be agreed, for example, that among the many through whom the wonderful modern plastics industry traces its descent there stand out an Irish gentleman, a French state official, a Manchester schoolmaster, a German professor, and an American industrial research chemist. Truly inspiration bloweth where it listeth and no man can tell whence it cometh and whither it goeth.

The Study of Life

The forms of plants and animals, the structure and function of their parts, have slowly unveiled their mysteries, and biology has joined with chemistry to create the modern art of medicine. All the sciences have now converged on the study of life, from the simple cell to that most wonderful of instruments the human brain. In the last hundred years the pattern of daily life has been transformed. Things which in the reign of Charles II would have seemed like the dreams of visionaries or indeed the impostures of charlatans are now part of the common scene. Flight, speech, and vision across the world, cures as by miracle from deadly illnesses, machines to which men delegate heavy toil, dextrous manipulation or mental exertion far beyond their own unaided powers, colours surpassing the rainbow in variety—all these things and more have come into being. The keys to unlock atomic energy have placed in man's hands undreamed of powers which he may use for good or evil. The keys which unlock some of the secrets of human personality are slowly being cut, and men may soon be using them to do we know not what. Is this not history?

In the realm of ideas the story has been even stranger and more turbulent. The conception of the universe as a mechanism suggested a materialistic view of all existence, though not to Newton himself, and possibly less often to men of science than to onlookers unconscious of the real intention of scientific hypotheses. The time scales revealed by geology and biology appalled those who confused the literal truth of Genesis with the basis of religion and morality. And when the theory of evolution completed the outrage of man's expulsion from the centre of the universe by denying his special creation, resistance rose to its height. The opposition subsided, only to be renewed at intervals against scientific doctrines, all of which have been of unquestioned utility in their own spheres, about the unconscious mind, about the chemical basis of genetics, the functioning of the brain and nervous system, or about the influence of hormones on personality.

Yet the men of science themselves, as far as can be judged, have numbered about the same proportion of religious believers as the generality of people. Nor have they been conspicuously less well endowed with kindness or morality. Indeed, an assurance that ultimate values of goodness and beauty can never be shaken by the pursuit of truth, wherever it may lead, is perhaps the sign of a robuster faith than is shown by recoil from every new and seemingly disturbing fact. Meanwhile, in the natural course of discovery and interpretation, and uninfluenced either way by real or supposed philosophical or theological implications, scientific ideas evolved in a direction where they largely lost again their mechanical and materialistic semblance, and acquired a curiously abstract character. Indeed some physical principles (though not I think adequately understood) have even been used in the present century in support of idealistic philosophies or to provide a doubtful support for the otherwise respectable doctrine of free will.

Nature's Invisible Substratum

The quantum theory added a new element, that of discontinuity to the Newtonian conception of the world. Electrical particles, the building blocks of matter, filling the universe with electromagnetic waves by their motions, had offered for a time a synthesis of grand simplicity, powerful enough to create the whole technology of radio communications and a major part of the electrical industry, yet itself destined for a revolutionary metamorphosis. Nature gradually disclosed that the invisible substratum of things, electrons, particles, and waves, could no longer be described at all in terms applicable to the macroscopic world of the senses. Intuitive notions of space and time had been called in question by the theory of relativity; the idea of a sub-atomic particle now became expressible only in terms of an abstract mathematical equation. Electrons themselves proved subject to the peculiar rule that only so many of them could be present in one system as were absolutely distinguishable by individual values of certain numbers which prescribe their state. Separate existence and experimental distinguishability were essentially linked. It is this almost metaphysical principle which accounts for the complete system of the chemical elements, with all their rich and varied detail. Particles appearing in nuclear disintegrations at high energies, mesons and the like, possessing the character of transience and decaying into others, present today an enigma which will probably not be solved until radically new principles have been discovered. The mysteries of the minute world of the atomic nucleus are found in magnified reflection in those of the stellar universe. How did the present cosmic era start? Will it be renewed? Is the so-called ultimate particle itself a cosmos of still smaller things? Is the known universe contained within a particle belonging to some higher order? Mystery and fascination have no end, the pursuit of knowledge has no limit. Three hundred years have witnessed the most colourful adventure ever undertaken. Is this too not history?

And in the broader sense this story is that of the Royal Society, for its membership has known no restriction of race or nation. It has been proud to number a goodly proportion of the world's greatest men of science among its foreign members.

Individual and Community

The real actors in the drama of these centuries have been individuals, often rare individuals. What, then, in it all has really been the role of the Royal Society as a corporate body? This question is related to that most profound of problems, the relation of the individual to the community. The hierarchical ordering of things, which can be seen both in the inorganic world and in the organic world, makes the community of one order the individual of the next order, not only through the gradations of human society and the animal kingdom but in the relation of cells to tissues, electrons to atoms, and atoms to crystals. An almost metaphysical principle rules communities of electrons, chemical influences co-ordinate the lives of separate cells, and, to quote a single instance from biology, some mysterious kind of transmission beautifully regulates the flight of certain flocks of birds.

The modes of communication in human societies are known, but what remains mysterious is the blend of rational and emotional influences that determines the response. The great movements of thought and even the lesser ones of whim and fashion spread from leaders. Only minorities in general exercise an independent taste and judgment or produce original thought. Yet at one time a prophet is followed and at another he cries in the wilderness. Avogadro and Mendel achieved their fame posthumously. Literary reputations wax and wane. The shrewdest are unable to predict with certainty what public response to anything will be. The propagation of an idea demands the right conjunction of unknown human factors, but even when these are propitious nothing will initiate the change save the operation of a minority small enough to defy statistical considerations. Often indeed the minority begin with a single individual who alone would be helpless. And thus the majority and the minority are held in mutual dependence.

Scientific investigation needs material ways and means, and the further knowledge advances the more lavish becomes the scale. The individual in isolation becomes, except under rare conditions, correspondingly impotent. But the community as a social and political whole cannot be expected to possess the detailed understanding to support him. Nor, today, with the tremendous issues at stake, can it remain indifferent. What therefore must be created to mediate between the individual and the major group is a specialized minor community large enough to command prestige and confidence, but with membership confined to those who place the claims of knowledge first. The principles which should govern the constitution of such a body are highly important. Specialized organs of the government are by themselves unsafe, being too exposed to the changing winds of expediency. Universities suffer from the disadvantage that on the one hand a given branch of knowledge is divided and scattered among many of them and on

the other hand they have competing preoccupations of importance to them commensurate with that of learning.

An academy therefore is the natural body to provide for several vital things: non-commercial periodicals for the publication of discoveries, a measure of financial support for ideas still too embryonic to be of immediately obvious practical application, the mutual stimulus of association and discussion, and the immaterial reward of honour for intellectual achievement. Governments may act as patrons. They can and do solicit and receive the help of learned men, they favour and encourage enterprises which they judge to be timely, but they cannot provide for men of science the intangible yet powerful encouragement which comes from acceptance and election by their peers. The academy, if it maintains high standards of unquestioned impartiality, sets the tone throughout the scientific community, and its influence is felt in every quarter. It is no rival to government organizations or to industry, and should maintain the closest connexions with them by electing into its number the leaders from both. Because men of action and men of authority esteem it an honour to be elected, the academy exerts its influence far beyond the confines of the learned world. The professional men of science hear of the needs of the state and of industry which in their turn are irrigated by the currents of scientific thought. The intercourse on terms of equality between the representatives of these different estates of the nation is like a sensitive nervous mechanism endowing the community which possesses it with capacities and potentialities realizable in no other way. The subtle co-ordinating action of an academy can no more be replaced by a bureaucratic organization or a system of economic incentives and deterrents than the intricately evolved biological controls of a living organism can be replaced by crudely devised mechanical appliances.

And as Nature herself takes infinite pains over the perpetuation of the species, making this indeed in most respects her first concern, so the right choice of its members is a matter demanding the most anxious care of the academy, and is perhaps the most important thing it has to do.

This, then, is the conception of the Royal Society, implicit already in the personalities of its original members and in their relation to its royal Founder, and moulded by the humane tradition of 300 years, that it should mediate between the individual and the community, depending on the loyalty of the one and on the sympathetic understanding of the other. The record of what the natural sciences have contributed to life and thought should justify the claim that this humane tradition has borne good fruit.

Science has never been restricted by the confines of nations and we proudly claim the Foreign Members of the Royal Society as leading actors in its story. Nor is it too much to maintain that the flow of ideas and of goodwill through scientific channels has contributed, and can contribute, sometimes in adverse circumstances, towards the peace and harmony of all mankind.

Mace presented to the Royal Society by Charles II in 1663

On this day of commemoration, when the Royal Society lays the account of its stewardship before the world, it is meet to look not only backwards but forwards. What is to be the future of science? Extrapolation of history is impossible, perhaps in principle, certainly in practice. The equations of the present allow three possible types of solution for the future. Decline and catastrophe have been predicted on one ground or another, in spite of science, by overpopulation and starvation, or, through the agency of science, by wholesale destruction in nuclear warfare. Continued and accelerated progress have been confidently foretold, the curve sweeping upward faster and faster as each advance in knowledge multiplies the possibilities of further discovery, and as man more consciously assumes control of his own further evolution. Between lies the third and less spectacular solution, that the curve will level out or gently undulate. But the equations are insoluble, at least by any means we know. The uncertainty afflicts and inhibits some people, but their timidity is hardly justified or useful. There has seldom if ever in the world's history been a time when existence was not in some degree precarious, yet the right response to danger lies in action. Faith in the future has indeed a very great survival value. The better equipped are certainly more likely to survive than the worse equipped, and not only to save themselves but to save others.

The task of the men of science is therefore clear. It is to go ahead undeterred by any of the uncertainties. Faith in science is not incompatible with or exclusive of any other kind of faith. Indeed there would seem to be no inconsistency in believing that scientific knowledge is itself one of the great instruments of higher ends. However that may be, duty, expediency, and the zest of living unite their voices in calling for unremitting effort, not in the certainty but in the hope and faith that knowledge may advance, mastery over environment increase, drudgery be abolished, sickness healed, the people fed, and life made happier. If social and moral problems are raised they are not essentially new but part of an age-old drama, and should neither be allowed to cause despondency nor to justify obstruction or abstention. The ancient choice between good and evil is in principle unchanged by the scale or fullness of existence. Men have always had to struggle with their environment, with one another and with themselves. Not exemption from danger, hostility, or temptation but the power to sustain their impact has made men what they are. The great weapons have been the things of the mind, and among the greatest of these is knowledge. While the old men dream dreams and the young men see visions we should go forward undeterred, that the dreams may become reality and the visions be fulfilled.

This commemoration is for us a great event in our history. The future is unknown. The chronicles record the actions and the thoughts of men, and if, as well may be believed, thought is a creative process, then the future is more than deeply hidden: it is uncreated. The golden promises augured by the release of nuclear energy, by the exploration of outer space, by the discoveries of genetic mechanisms, may in one way or another be redeemed, but the best are yet unspoken. A great upheaval of ideas may come with a complete reorientation of science in its relation to philosophy and to the conception of possible worlds. But we know neither the day nor the hour.

It is the duty of the Royal Society not to predict, not to legislate, but to maintain within the larger community the smaller one in which creative activity can flourish. Its members owe a multiplicity of loyalties, none of which can be fulfilled without the others: to mankind in general, to their native land, and to the Royal Society itself. But that is not all, for there are communities in time as well as space. The most original minds, in some sense isolated in all contemporary groupings, find their true affinities in continuing the sequence of their predecessors, and their fulfilment only in their successors. In a measure this is true not only of genius but of all men. It is what moves us in history. It is what the honouring of this occasion means.

Our cover design is based on the decorated first page of the Royal Society's first charter (1662), with the original pen-and-ink portrait of the Society's royal Founder and Patron, King Charles II.

The Listener

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The Royal Society

TO be a Fellow of the Royal Society is one of the highest honours that can be won by a modern scientist. This year the Society is celebrating its 300th anniversary, and many distinguished foreign scientists, who are official guests of the Society, are now gathered in this country to take part in the commemorative festivities. Of course such dates are little more than excuses for appropriate jollifications. It seems established, for example, that the Society's origins really date from about the year 1649 under the impulse of Dr. John Wilkins, then the Warden of Wadham College. Wilkins—'the architect of the Royal Society'—had the unique distinction both of being Oliver Cromwell's brother-in-law and later becoming a bishop. 'He put into the Port of Matrimony', it was recorded, in order 'to ride out the storm' of the Interregnum, but 'after the King's Return, it was for a while a Spoke in his Cart'. In any case John Aubrey, the antiquary, who himself was a Fellow of the Society, indicated that 'the beginning of philosophical experiments' derived from Oxford and Wilkins rather than London and King Charles II. Nor should the influence of Sir Francis Bacon be forgotten.

These experimental philosophers were some of them dilettantes. Nevertheless, as Sir Cyril Hinshelwood observes, the 300 years or so since the Society was originated have in achievement 'exceeded all the infinite wastes of evolutionary time'. Naturally the break from medieval ideas and methods was neither sudden nor complete. Newton and Boyle both dabbled in alchemy. Newton, a curiously neurotic figure, spent much of his life on theology. Still it was at that time that the spirit of scientific scepticism took the air. The annual elections of the Society being held on St. Andrew's Day, Sir William Petty, father of statistics, remarked that he would 'rather it had been on St. Thomas's Day, for he would not believe till he had seen and put his finger into the holes; according to the motto *Nullius in verba*': 'take no theory on trust'.

The advance of science was not a specifically British phenomenon. The discoveries of foreign astronomers and mathematicians—French and Dutch—in the sixteenth and seventeenth centuries stimulated the exuberant curiosity exhibited by the first members of the Royal Society. Their interest stretched into the realms of art and industry, for the 'promotion of natural knowledge', then as now, knows no confines. Equally it has now to move forward in spite of the perplexities of politics or the claims of religion. We should do well to ponder these words of the present President of the Royal Society:

> The task of the men of science is therefore clear. It is to go ahead undeterred by any of the uncertainties. Faith in science is not incompatible with or exclusive of any other kind of faith. Indeed there would seem to be no inconsistency in believing that scientific knowledge is itself one of the great instruments of higher ends. However that may be, duty, expediency, and the zest of living unite their voices in calling for unremitting effort, not in the certainty but in the hope and faith that knowledge may advance, mastery over environment increase, drudgery be abolished, sickness healed, the people fed, and life made happier.

Theirs is a noble calling. If their discoveries are perverted, the blame will hardly be theirs.

What They Are Saying

The RB-47, and the Congo

COMMUNIST RADIO STATIONS in their propaganda about the RB-47 incident have been laying most stress on what they consider are the implications of the affair for countries which have United States bases. Moscow home service commented as follows:

> The news of the Pentagon's latest provocation has caused indignation among the wide masses of the British people. Anxiety regarding the prudence of keeping the American bases, which had been expressed before, has lost its abstract character.

The Soviet radio went on to say that the *News Chronicle* correspondent, David Willis, had written that the agreement under which the U.S. use British airfields is so loosely drawn up that it is impossible for any British politician or Service chief to know the origin or destination of any American bomber or fighter taking off from Britain; and the Russian commentator declared that 'the well-informed *Wall Street Journal*' had said that American military circles admitted that the RB-47 was on a special reconnaissance mission; it was determining the location of Soviet radar installations. 'That', added the Russian commentator, 'is much more like the truth'. Other Soviet transmissions quoted as evidence of the demand for the closure of the U.S. bases in Britain statements by: the Lancashire Federation of Trades Councils, the Yorkshire Federation of Trades Councils, the London district committee of the National Union of Railwaymen, the general secretary of the National Union of Vehicle Builders, and the Tavistock branch of the Labour Party.

'Radio Independent Spain', situated on Communist territory, broadcast an interview with Frederico Sanchez, a member of the Spanish Communist Party Executive Committee, who said:

> After the provocative U-2 flight, after the justified Soviet warnings to the countries on whose territories the Yankee imperialists have military bases, Spaniards of all beliefs have acquired a much clearer conception of the deadly dangers these bases represent.

In broadcasts on the Congo situation Communist stations have been mainly concerned to attack the Western Powers for what *Pravda* was quoted by Moscow Home Service as calling 'a premeditated conspiracy' against the new State. The *Pravda* article, as quoted, went on to declare that although under increasing pressure from world opinion the U.N. Security Council had taken a decision on the Congolese Government's appeal concerning Belgium's act of aggression against the Congo, reports to hand made it plain that the imperialist Powers in the U.N. had attempted to take the aggressors under their wing. Neither the statement by President Eisenhower nor the speeches by the U.S., British, and French representatives on the Security Council had so much as a hint of condemnation for the Belgian colonial robbers and murderers who had run amok in the Congo, added the Russian commentator.

Yugoslav transmissions adopted a different tone in their comment on the Congo situation. Some of them quoted the Yugoslav newspaper *Borba* which praised the United Nations Security Council's resolution on the Congo as 'a reasonable and positive decision'. *Borba* stressed that the independence of the African territories is already something that cannot be arrested, and that these territories require assistance to do what decades of colonial government have not done, to put through accelerated economic and social transformation. The normal development of conditions in the Congo having been hampered, concluded *Borba*, direct U.N. military assistance became necessary. The Yugoslav newspaper *Politika* was quoted as saying that the sending of Belgian troops to the Congo was a violation of the sovereignty of this independent State. Secretary-General Hammarskjöld had to co-ordinate the positions of the Belgian and Congolese Governments. In this connexion, the Yugoslav writer recalled that during the negotiations and preparations for the independence of the Congo the Belgian Government had shown considerable realism, and he expressed the hope that it would again let this realism find expression, and that it would not impede that which could not be arrested.

—Based on information collected by the B.B.C. Monitoring Service

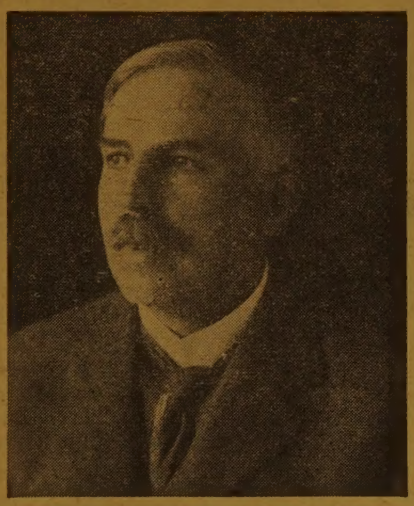
DERRICK SINGTON

Did You Hear That?

SOME FAMOUS FELLOWS

IN A PROGRAMME being broadcast in the General Overseas Service of the B.B.C. to mark the tercentenary of the Royal Society, SIR HENRY DALE, O.M., F.R.S., and SIR JOHN COCKCROFT, O.M., F.R.S., recalled some of the famous Fellows of the Society they have known.

Sir Henry Dale: 'Twice within living memory the ancient Royal Society, after the diversions created by the two world wars, has resumed with relief and with renewed vigour under successions of distinguished presidents, its historic task, in the words of its charter, of "promoting by the authority of experiments the sciences of natural things and of useful arts". Between the two wars its presidential chair was thus occupied by J. J. Thomson, Charles Sherrington, Ernest Rutherford, Gowland Hopkins, and William Bragg. My own contacts at the Royal Society were closer with two out of the five—Ernest, Lord Rutherford, and Sir Frederick Gowland Hopkins—because their two five-year terms, as President, happened to coincide with my own ten years as one of the secretaries.



Lord Rutherford, O.M., 1871-1937

'I had known Hopkins since 1898 when, already a man of middle age, he came to Cambridge, where I was then still a research student. He came to create a department then new in its aim, not only for Cambridge, in which the methods of exact chemistry would deal with the tissues and the life processes of animals and plants. I remember encountering him one day when he was excited about an accidental observation which, he believed, was going to lead him to an important discovery. It did so indeed; eventually, in fact, to what most people know him for—his pioneering discoveries about those special substances, the vitamins, of which man and his domestic animals must have traces in their food if they are to grow and develop normally and to remain strong and healthy.

'In scientific circles it is everywhere recognized that Hopkins was, further, one of the pioneers of the great modern science of biochemistry, which is now offering problems for research to so wide a range of the sciences—physical and chemical, as well as biological and medical. Hopkins was a man of small stature and slight physique, and of a sensitive, sympathetic character, who seemed often to doubt, for himself, the greatness which others so readily recognized in him.

'Rutherford, his predecessor as president, was, by contrast, a man of big personality in every way—with a large frame, a strong voice, a straightforward, emphatic, on occasion even a boisterous manner. He seemed to vitalize and to raise the level of any discussion; and his greatness was so obvious that it seemed natural that he, too, should just take it for granted.

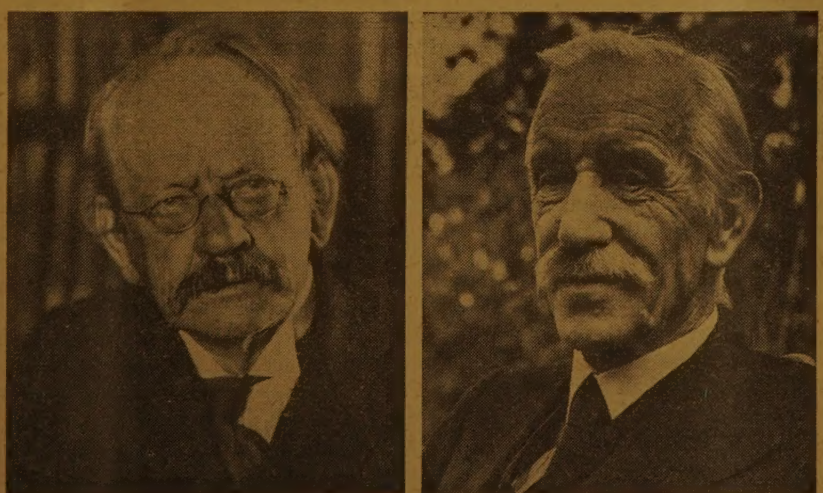
'I had first met him even earlier at Cambridge in 1895, when I was an undergraduate and he had just arrived there from New Zealand, as a post-graduate research student with a reputation already for research of high promise in experimental physics. By the time that I made close contact with Rutherford, again, at the Royal Society thirty years later, the splendid record of his researches in Montreal, in Manchester, and again in Cambridge, had established him as a world leader into the new, sub-atomic era of physical science and of human civilization. When he died, all too early, in 1937, men spoke of him as "The Newton of the atom" and as "the greatest man of science since Isaac Newton". But Rutherford had, in fact, but little interest in the new, mathematical interpretations of the universe, which others were basing on the new knowledge of atomic structure. "What will be left of any of them in another twenty years?", I heard him say. "What we need is more experimental facts, and, by Jove, I am going to get them!" And, indeed, he and the brilliant group of his Cambridge pupils continued to get them at an astonishing rate.

'I recall an occasion at the Royal Society when Rutherford opening a discussion, with Hopkins in the chair, made proud reference to a then new achievement of two of his pupils, Cockcroft and Walton, who had, for the first time in a deliberate experiment, succeeded in splitting the atomic nuclei of a light metal, lithium. "Cockcroft and Walton must be here somewhere", he exlaimed; "Stand up, you boys, and let them see what you look like!"'

Sir John Cockcroft: 'When I began to do research work in the Cavendish Laboratory in 1924 Sir J. J. Thomson, who had made the tremendous discovery of the electron in the laboratory twenty-seven years earlier, was still carrying on his research work. At the far end of the large room we called "the garage", which he had built out of Lord Rayleigh's Nobel Prize and the savings of the Laboratory, was a table housing a maze of glass tubing, electrical discharge tubes, and ancient measuring instruments, which were kept in working order by his assistant, Everett, from whom I learnt glass blowing and bought the famous Everett wax used for sealing vacuum joints. Every day at about one o'clock J. J. walked along from Trinity wearing a bowler hat and waggling a walking stick behind him. I often met him as I was going out to lunch and he would stop and grin and exchange a few words about Lancashire cricket, as befitted a fellow Lancastrian and graduate of Owens College.

'J.J.'s sphere of influence did not extend beyond "the garage" and Rutherford presided over the remainder of the Laboratory. Rutherford had come to Cambridge from Manchester in 1919 and was continuing the researches which had led to the first artificial transmutation of matter, using equipment he could carry in one hand, sitting each day for an hour or so in a darkened room counting the tiny pinpoints of light made by his flying atomic particles.

'I worked under Rutherford's general direction for thirteen years. During this time nuclear physics research apparatus changed from Rutherford's small-scale, simple equipment to use electronic methods of recording nuclear particles, and we built with our own



Sir Joseph John Thomson, O.M., 1856-1940, and (right) Sir Frederick Gowland Hopkins, O.M., 1861-1947

hands the first nuclear accelerator out of glass cylinders, steel tubes, and plasticine, an apparatus which for those times looked enormous. The accelerators enabled atomic nuclei to be split up by atomic projectiles speeded up by high voltages, and inaugurated a new era of nuclear physics research. Rutherford was tremendously enthusiastic about these developments, so much so that he diverted Oliphant from his researches to build another accelerator, and the Rutherford-Oliphant experiments showed that heavy hydrogen nuclei could be joined together to form helium or tritium, producing neutrons in great quantity. These were the first so-called fusion reactions to be produced in a laboratory, and they have had immense practical consequences since.

'Rutherford's life was dominated by his passion for new experimental results in nuclear physics. Everything else in physics was secondary. He was good at picking young people and he drove them hard. But he was much more than the world's leader of nuclear physics: he was interested in men and books and golf, and was one of the best raconteurs in the scientific world. C. P. Snow reminds us of a remark made to him: "Lucky fellow, Rutherford, always on the crest of the wave"; and his reply: "Well, I made the wave, didn't I?" He certainly did'.

A woman bard of the Kazakh Soviet Socialist Republic with her two-stringed lute

A BARD OF KAZAKHSTAN

While JEAN JENKINS was travelling on the borders of China and Mongolia, collecting examples of traditional music, she met the Kazakh bard, Rosa Baglanova. In 'Woman's Hour' (Light Programme) she described this encounter.

'I met Rosa in Alma Ata', she said, 'the capital of Kazakhstan in Soviet Central Asia. She is small, with dark hair and eyes and enormous vitality and charm. She had rushed back from a village high in the mountains, where she was singing, to meet me and talk about folk songs. Certainly Rosa, with her traditional white silk dress with gold embroidery, her fur-trimmed velvet cap, and supple red leather boots, was as attractive to see as to hear. When that is added to the fact that she knows hundreds of Kazakh songs, and has a beautiful voice, both powerful and sweet, it is easy to see why she is one of the most famous singers of central Asia.

'The Kazakhs are Moslems but, unlike their farming neighbours in the oases, they built no mosques, and their women have always been allowed much more freedom than is usual with Moslems, and are permitted to go unveiled. Their religion sits lightly upon them, and that explains why the Kazakhs have these famous women bards, not only now, but in the past also. The title of bard is not easily won; it is regarded as a great honour among the Kazakhs. They were nomads until a few years ago, living in round felt tents, called yurts, and moving from pasture to pasture with their herds. They are famous horsemen, these descendents of Genghis Khan and the Golden Horde; they hunt on horseback, using eagles to fetch the game. And they do not only ride their horses; they milk the mares, and make a fermented drink called koumiss which they practically live on all through the summer.

'Being nomads they have only two musical instruments, both easy to carry, but singing is developed to a fine art. Their bards must be able to sing the songs and legends of their people, to play at least one of their instruments, the *dombra*, a two-stringed lute, and—most important of all—to improvise. The new songs must be witty and clever, and possess real musical quality. Before the coveted title of bard is won, the singer has to take part in a public singing contest, pitting his wits and skill against that of the already established bards. These contests are held out of doors, and as many as 50,000 people may turn up, and stay for several days of singing. You can imagine the voice-power necessary if a singer is to be heard in the open air by 50,000 people!

'From the time that she became a bard, Rosa spent most of her time singing, from one end of Kazakhstan to the other. It is a big country, almost as big as England, France, Germany, Holland, and Belgium put together. She goes across the steppes and high into the mountains, but instead of travelling everywhere by horseback, as bards did in former times, she most often uses aeroplanes and helicopters. I also used aeroplanes and helicopters to reach Kazakhstan and record the bards.

'Wherever Rosa goes Kazakhs gather, and a feast is held after the singing. Indeed the bards are so honoured among the Kazakhs that nothing is too good for them'.

TO THE RESCUE

'A remarkable incident occurred in my village the other day', said ERIC ROBERTS in 'Today', 'which seemed to me to demonstrate clearly intelligence, as opposed to instinct, in animals.

'For a long time, sparrows have been in the habit of roosting in a garage in the village, and the other day one of the birds got its head stuck in an entrance hole high up in the wall. Its body was hanging outside, and despite its vigorous efforts the bird was unable to free itself. An attempt was then made to lever it gently out of the hole with a long bamboo cane, but without success.

'Then, while the next move was being contemplated, a most extraordinary thing happened. Another sparrow, perched on the gable of the garage, suddenly took off and plummeted to earth with its wings closed. As it came level with the trapped bird, it grabbed frantically at its tail, hung on for a few seconds, then had to let go, and flew down to earth. In a moment, however, it was up on the gable again, and taking off for a second attempt.

'Several times the sparrow dived down in this way, each time hanging on to the trapped bird's tail for as long as it could. But the scheme did not work. So another bird came to the rescue. This little chap, if you please, dived down seconds after the first bird, and hung on to *its* tail, making three in a row. This combined effort was repeated several times, and at last the sparrow was freed, not much the worse for its ordeal except for a few missing feathers (and no doubt a sore neck) and some damage to one leg'.

On May 7, 1955, Douglas Ritchie, then B.B.C. Head of Publicity, suffered a stroke which left him unable to speak and with his right side paralysed. He has now written the diary of his recovery, *Stroke* (Faber, 12s. 6d.), which will be an illuminating document for relatives of the 750,000 people estimated to be alive in this country after a major stroke.

The Early Days of the Royal Society

By SIR GEOFFREY KEYNES

FELLOWSHIP of the Royal Society—that is the F.R.S.—is universally accepted as the hall-mark of scientific distinction, and the Society can claim to be the oldest and most respected organization of its kind in the world. Ever since the Renaissance in Europe there had been stirrings in men's minds, leading them away from the old Aristotelian dogmas and ecclesiastical authority towards a more liberal attitude to the understanding of the workings of Nature. It was Sir Francis Bacon who first defined this new attitude in his great book, *Instauratio Magna,* published in 1620. Here he laid down the principle of reasoning by induction and verification by experiment. A few years later, in his *Sylva Sylvarum,* he sketched out a history of Nature and suggested innumerable experiments by which its mysteries might be elucidated. Bacon would not have thought of himself as a 'scientist'—this term was not invented until 1840—and he is not known to have carried out any experiments himself until almost the last day of his life. Then, one winter's day early in 1626, he got out of his coach to gather some snow to be stuffed into a fowl so that he might observe the effect on the preservation of its flesh. This action brought on an illness from which he died. Until that fatal day he had evolved his ideas sitting in his arm-chair; but the intellectual ferment was working in other men's minds and impelling them to action.

John Wilkins, Bishop of Chester: a portrait by Mary Beale
From the Royal Society's collection

In England the first major advances in knowledge by inductive thought and experiment were made by Dr. William Gilbert's work on the magnet, and Dr. William Harvey's demonstration of the circulation of the blood. The work of both these investigators had been done before Bacon's book was published. Their minds had run on parallel lines with Bacon's, but, while Bacon mused, they acted. All three of them had their influence on other scholars, who began soon after the year 1640 to hold informal gatherings at Gresham College in London, where they could discuss matters of scientific interest without interference from ecclesiastics or politicians.

We know little about these pioneers; but one of them must have been John Wilkins, cleric and mathematician. During the Civil War, Wilkins was a parliament-man, and under Cromwell became Master of Trinity College, Cambridge. He had a pretty fancy in scientific matters, and wrote books entitled *Mathematical Magic, The Discovery of a World in the Moon,* and *Mercury, or the Secret and Swift Messenger.* In the third of these he examined all the possible means of secret communication by codes, signals, gestures, musical notes, and conveyance by birds or arrows. Another of the group is likely to have been the flamboyant Sir Kenelm Digby, adventurer and exploiter of the mysterious cure of wounds at a distance by means of what he called the Powder of Sympathy. He made no secret of the fact that the powder was nothing more than vitriol, that is sulphate of iron, dissolved in water, but he advanced learned pseudoscientific arguments to explain its beneficial operation. Lord Brouncker, a mathematician, was probably another of the group, with eminent doctors such as Walter Charlton and Harvey's friend, George Ent.

From the reminiscences of John Wallis, another eminent mathematician, we know that by 1645 a company of at least seven men was meeting regularly in London in private houses or at Gresham College. Besides John Wilkins, these included four medical men, Samual Foster, the Gresham Professor of Astronomy, and Theodore Haak, a German scientist: it was he who first suggested holding the meetings. Their discussions centred on medicine and anatomy, chemistry, magnetism, geometry, astronomy, navigation, statics and mechanics, with various experiments related to these sciences. They particularly welcomed also any information regarding the progress of scientific knowledge abroad. Theology and politics, incidentally, were barred.

It happened that at the end of 1648 Cromwell appointed John Wilkins to be Warden of Wadham, so Wilkins moved to Oxford. John Wallis and Jonathan Goddard, one of the doctors, joined him there and so did a number of others: there was Dr. Seth Ward, who became Professor of Astronomy at Oxford and later Bishop of Salisbury; Dr. Ralph Bathurst, medical man and cleric, afterwards President of Trinity; Dr. William Petty, who was to become a famous economist and statistician; and Dr. Thomas Willis, the eminent physician. Then, in 1654, there arrived the greatest of them all, Robert Boyle, younger son of the Earl of Cork. Boyle told in his letters of the meetings held in Oxford by the body calling themselves the Philosophical College, but their meetings were still private and informal, and Boyle himself called them 'our invisible College'. This idea of a philosophical, that is, scientific, College probably owed its origin to Bacon's account of the founding of such a society in the intellectual Utopia described in his unfinished work, *The New Atlantis.* The aims of this society, in Bacon's words, were 'the Knowledge of Causes and Secret Motions of Things, And the enlarging of the bounds of Humane Empire to the Effecting of all Things possible'.

Meanwhile similar meetings were being held in London; but the Commonwealth Government suspected that the universities might harbour nests of Royalist sympathizers, and was continually placing its own supporters in positions of influence, particularly at Oxford. So Oxford tended to become the centre for the new scientific spirit; it kept this position until the Restoration of King Charles in 1660, when London again became the centre of attraction. The philosophers certainly met repeatedly in London in the spring and summer of 1660, and were discussing the establishment of a more formal Society, but not until November 28 do we get the first written record. On that day, after a lecture at Gresham College by Dr. Christopher Wren, the Professor of Astronomy, twelve men 'did according to the usual manner withdraw for mutual converse'. They discussed the founding of a college and decided that they should meet weekly, each

subscribing ten shillings on admission and one shilling a week thereafter towards expenses. Dr. Wilkins was voted chairman.

In August a valuable new member had arrived in London in the person of Sir Robert Moray. This quiet but eminent Scotsman had been a faithful supporter of Charles I and was now in high favour with his son; so news of the beginning of the scientific college soon reached the ears of the King. Moray was himself an expert chemist and musician with much general culture; he played an active part in founding the new Society, and became the first President. Of the twelve men who attended the preliminary meeting at least five bear names well known to posterity: Sir Robert Moray, Dr. Wilkins, Robert Boyle, Dr. Petty, and Dr. Wren.

Of these Boyle was later pre-eminent in pure science. His main interest was in chemistry, but he was also a notable physicist. His researches into the property of gases resulted in the establishment of 'Boyle's Law', stating that at a constant temperature the volume of a gas is inversely proportional to the pressure to which it is subjected. He combined scientific acumen with a gentle piety, and his numerous books cover all his interests. They also testify to his extraordinary industry and his wide-ranging curiosity—he made contributions of primary importance to the sciences of chemistry, physiology, thermodynamics, hydrostatics, the theory of light, crystalography, and meteorology, and advanced the knowledge of subjects such as combusion and the oxidation of metals, phosphorus and phosphorescence in animals, and specific gravity. He also made important observations in medicine, and invented the graduated thermometer—not the clinical one. Boyle combined great intellectual capacity with an attractive simplicity of mind. His rather naïve book, *Occasional Reflections*, 1665, was ridiculed in Swift's *Meditations on a Broomstick*, and his reflections arising out of the eating of oysters are supposed to have suggested to Swift the theme of *Gulliver's Travels*. Boyle's health was poor, but he lived to the age of sixty-four; he had vindicated more than any other man the importance of experiment in the advancement of knowledge.

Robert Boyle: a portrait by F. Kerseboom
From the Royal Society's collection

Dr. William Petty—he was knighted in 1665—exhibited also the extraordinary variety of attainments so characteristic of these early scientists. He was a precocious and adventurous boy. At fifteen he was determined somehow to go abroad, and eventually achieved this by joining a French ship as cabin boy. After some months of ill-treatment he broke his leg and was put ashore—that is, abandoned, at Caen; here he astonished the inhabitants by being able to describe his misfortunes in both Latin and Greek. From this point he never looked back. He supported himself with great ingenuity and entered the university at Caen, where he learnt the mastery of mathematics, astronomy, and navigation. He then entered the English navy, but found that he had no taste for fighting, so he discharged himself and spent some years in Dutch universities and at the anatomy school in Paris. Here he became a close friend of Thomas Hobbes and met many other eminent men. He returned to England in 1646, where he presently patented a machine for writing letters in duplicate. In 1649 he joined Wilkins and the others in Oxford, and took the degree of Doctor of Medicine, and later became Professor of Anatomy.

A year later Petty and Wilkins gained great celebrity by restoring to life out of her coffin a woman who had been hanged for killing her illegitimate child. The woman remained legally dead; but nevertheless she married and raised a family. In 1651 Petty became physician to Cromwell's army in Ireland, and this led to his undertaking the huge task of surveying the whole of Ireland and distributing part of the land to Cromwell's soldiers. The Restoration found Petty in London again among his scientific friends, and this ensured his having a part in founding the new Society. In 1664 he invented and built a double-bottomed ship; he persuaded the King to add this to his fleet, but to no purpose, for it perished with the others in a great storm the next year. In the succeeding years Petty was mainly occupied with Irish affairs and with political economy and statistics. He was largely responsible for preparing the first statistics of deaths in the City of London, known as the Bills of Mortality.

Of Dr. Wren, I need not say much. As Sir Christopher Wren, leader of the architectural rebirth that followed the Great Fire of London in 1666, he is sufficiently well known. But we seldom appreciate the variety of his attainments. John Evelyn met him first at Oxford in 1654 and referred to him as 'that miracle of a youth', a description fully justified by the rest of his career. He did not apply himself to the study of architecture until 1663 when he was thirty-one years old. Before that he had worked at mathematics and held chairs of Astronomy both at Gresham college and at Oxford. Later he devoted much time to the study of medicine and anatomy and among many experiments he initiated was that of injecting a variety of fluids into the veins of animals. This led directly to the experiments carried out by other Fellows of the Royal Society of transfusion of blood.

Once the formation of a scientific society had been resolved upon it was plain that its scope must be enlarged. Forty names were suggested as those of persons suitable to be elected, and all but five of them responded; they included fourteen doctors, two poets (Sir John Denham and Abraham Cowley), Sir Kenelm Digby, Elias Ashmole the antiquary, Thomas Henshaw the historian, John Wallis the mathematician, and a sprinkling of lesser lights. It is remarkable that only one bishop, Dr. Seth Ward, was among them—remarkable when it is remembered how many clerics afterwards joined the ranks of the scientists. Abraham Cowley did not in the end choose to take part, although he had himself published in 1661 *A Proposition for the Advancement of Experimental Philosophy*. In this he drew up a detailed scheme for a College of Scientists, rather resembling that envisaged by Bacon in his *New Atlantis*.

William Harvey, the pre-eminent medical scientist of his century, had died three years before, in 1657; and so could not be honoured, but his close friends, Dr. George Ent and Dr. Charles Scarburgh, were invited, and, of course, Dr. Thomas Willis.

At a second meeting on December 5 most of those invited were in attendance, and Sir Robert Moray informed the company that their plans had the King's approval. Seventy-three other people also attended, presumably by invitation, and all of these were later elected to the Society. There is no record of any title by which the Society was to be known, but this was soon settled by John Evelyn, one of the original Fellows. In 1661 he published a translation of Gabriel Naudé's *Instructions concerning the Erecting of a Library*, and in the course of a dedication addressed to

Lord Clarendon referred to his help in the promotion of the Royal Society. This title was immediately accepted. The first charter granted by Charles II was sealed on July 15, 1662, and this might be taken as the official date for the foundation of the Royal Society; but the year of the first written record has been preferred as the date of its true origin. Under the Charter Lord Brouncker was named as President, and Sir Robert Moray became a member of Council.

The Royal Society was now fully launched. The King granted a second revised Charter in 1663 and a third in 1669. In 1663, 145 Fellows were elected, the most notable of them being Dr. Robert Hooke. This remarkable character had been given employment the year before as first Curator of Experiments for the Society. He had been admittted to Christ Church, Oxford, in 1653 as a chorister and servitor, and had soon attracted the notice of Dr. Willis, who made him his laboratory assistant. Thus he inevitably met the other members of the Invisible College. Wilkins gave him a copy of his *Mathematical Magic*, and he was soon transferred to Robert Boyle's laboratory as assistant. Here he became known for his vigorous mind and extraordinary inventiveness. It was he who in 1659 invented the improved air-pump used by Boyle in establishing his law, and by 1665 he was Professor of Geometry in Gresham College. For many years he carried out a large proportion of the experiments decided upon by the Fellows at their meetings, and indeed the Society could hardly have survived for long without him. His restless and acute mind made him a leading authority on various branches of physics, particularly the properties of light, on astronomy, on the use of microscopes, and on horology, to which he contributed the balance-spring watch, an innovation of the first importance. Among many other inventions he made the first spring balance and the first universal joint. His book, *Micrographia*, dealing primarily with the microscope, but incidentally with a variety of fundamental problems, is one of the most important books ever published in the history of science.

Gresham College, London, the first meeting-place of the Royal Society: an engraving of 1739 by George Virtue

Apart from all this Hooke was one of the foremost architects of his time, though this has been obscured by his having worked so much under the shadow of Sir Christopher Wren in the reconstruction of London after the Great Fire. Hooke's misfortune was his touchy and rather jealous temperament which involved him in many quarrels, notably with Sir Isaac Newton who was elected a Fellow of the Royal Society in 1671. Both of them claimed to be the first to make discoveries concerning the refraction of light, and Newton became so embittered that he refused the Presidency of the Royal Society until 1703, when Hooke was dead and no longer there to plague him.

The holding of regular meetings soon called for the publication of some record of the proceedings. Accordingly *Philosophical Transactions* began to appear early in 1665 as the official journal of the Royal Society. The first twelve volumes, from 1665 to 1678, form an indispensable storehouse of information about the early history of science. All the great names appear repeatedly with their various contributions to knowledge. Many of these seem trivial today, but others laid the foundations for advance in fundamental problems. One subject that did not appear in the *Transactions* was any account of the alchemical studies being carried on by a number of people, notably Boyle and Newton. Alchemy, being the pursuit of the secret of the transmutation of the baser metals into gold and of the 'philosopher's stone' or elixir of life, was an intellectual hangover from the Middle Ages; but it still exercised its peculiar fascination over some of the greatest minds. Newton's alchemical writings are extensive, but he always kept them secret and not even yet have they been fully examined. It was not shame that commanded secrecy: alchemy was thought a proper subject for scientific research; but the consequences of success would have been so devastating that no one must know how things stood. Newton was at all time secretive, and only with difficulty brought himself to publish even his supreme work, the *Principia Mathematica*. The act of parturition was painful, and even when it was over the author suffered agonies owing to his jealousy about priorities and his resentment of any criticism. Newton's mind was one of the finest scientific instruments ever known, but he was himself the prey of deep psychological conflicts.

It is clear from the list of names that from the very beginning in 1662 the Council did not intend to restrict their fellowship to persons primarily engaged in science. Apart from holders of professorial chairs there were few men corresponding to the professional scientists of today. The ranks were therefore filled with an odd assortment of gentlemen possessing nothing more than scientific curiosity. These might be dabblers in experiment, or they might just be amused by the proceedings of the 'virtuosos', as they were called. Samuel Pepys is a good example of the amused and intelligent observer. He was elected Fellow in 1664 and became President in 1684; he was a good administrator but by no stretch of the imagination could he ever have been regarded as a scientist. When the first experimental blood transfusions were being conducted on animals Pepys was an eager witness, and remarked that 'this did give occasion to many pretty wishes, as of the blood of a Quaker to be let into an Archbishop, and such-like'. Also in 1664 we find the name of Sir Winston Churchill, politician and historian, as a new Fellow, foreshadowing the election of his more illustrious descendant nearly 300 years later. He was followed soon after by Prince Rupert, who had a genuine interest in art and science, and by Gilbert, Archbishop of Canterbury. In the next year there were no outstanding scientific men, but it may be that Captain George Cook, the boon companion of Samuel Pepys on some of his less dignified occasions, infused some liveliness into the proceedings. In 1667 two distinguished medical men were elected—Walter Needham, the embryologist, and Richard Lower, first elucidator of the anatomy of the heart and pioneer in blood transfusion, together with John Ray, the father of systematic botany. In 1668 came John Locke to represent philosophy, and so on through the years to Halley (of the comet), Flamsteed, Mayo, Tyson—the catalogue could be endlessly extended.

Throughout his reign King Charles kept up his interest in the affairs of the Royal Society, but he was not only patron—he himself practised as amateur scientist. He liked to have his joke and had laughed at the scientists, says Pepys, 'for spending their time only in weighing of ayre'. Yet beneath his closet in Whitehall he had his own private laboratory, where he conducted experiments in chemistry and studied anatomy under the eye of

his physician. He was always aware of what was going forward among the fellows, and he encouraged investigation of subjects that directly concerned national interests, such as forestry, navigation, and ship-building.

The outlook of the Society was untainted by insularity. Frequent letters passed between Fellows and distinguished scientists abroad, many of these being welcomed to meetings and being elected to the Fellowship.

The activities of the early scientists seem rather diffuse and uncertain, but they were groping in the unexplored realms of science and without the help of the conspicuous sign-posts which direct the highly specialized researches carried on by their successors at the present day. From the beginning no opportunity has been lost of pursuing Bacon's aim of 'effecting all things possible'. We can see today how horribly close they have come to the attainment of this ideal.—*Third Programme*

Philosophers and Witts

MICHAEL HOSKIN on some limitations of the early Royal Society

TO be a Fellow of the Royal Society today is to be recognized as a leading professional scientist. But this has not always been the case. In fact, it was only in the middle of the last century that the Fellowship became predominantly scientific. Until then the great majority of Fellows were well-intentioned amateurs, and only a minority were professionally engaged in scientific activities. From the Fellows, said Sprat, the Society's first historian, is expected 'no more but what their business, nay, even their very recreation can spare'. The infant Royal Society, unlike the compact and highly-professional Académie des Sciences with its powerful government support, was characteristically amateur; and this fact dominated its early struggles for survival.

The most obvious difficulties were financial. The new philosophy was before all else experimental, and experiments cost money. To begin with, at any rate, this money had to come from the subscriptions of the members, and a weekly payment of one shilling was agreed at the very first meeting. A readiness to pay this substantial subscription and an interest in the new experimental science were the qualifications for membership.

But for all too many of the Fellows the sense of novelty soon wore off—some even said later that they had been 'drawn into the Society contrary to their inclination'—and for them the payment of the subscription rapidly became a burden. November 28, 1660, saw the first meeting. On May 1 following 'it was ordered that the treasurer, or his deputy, be desired to call every day on the members for their arrears'; and ten months later the amanuensis was 'to make a copy of the form of the obligation, to which every member at his admission subscribed: and either himself, or the operator, to attend the members now in arrears at their respective houses, in order to shew them the said copy, and to desire them to pay their arrears due by virtue of that obligation'.

It was never intended that this state of affairs should be other than temporary. The Fellows talked of the golden age 'when the society shall be indowed with a revenue', and the Crown was offered some practical suggestions as to how it might help finance the Society. But although King Charles was interested enough to send them objects for examination and to report to them his loss of weight through playing tennis, little in the way of cash was forthcoming. And so, in January 1665, the Council passed a resolution worthy of a twentieth-century university department: 'that the business of procuring benefactors, and the manner of well managing the same, should now be begun to be seriously considered of'.

Henry Oldenburg, first Secretary of the Royal Society, by Johannes van Cleef

From the Royal Society's collection

As Oldenburg wrote to Boyle at the time: 'No question this Society would prove a mighty and important body, if they had but any competent stock to carry on their designs'. But meantime the Society had to struggle along on the Fellows' subscriptions; or, rather, on such amounts as the treasurer succeeded in collecting. Meeting after meeting, year after year, the Council searched desperately for ways of coaxing or compelling the payment of subscriptions. What must Oldenburg have felt when he read in letters from Paris that there 'the King refuses nothing to the Academy. If it does nothing, it will not be for lack of aid', and that as regards the new observatory which was to be an integral part of the Académie, 'the King bids them not to spare as to charge, for he will be wanting in no expense, and he saith it will cost about 100,000 livres'? By contrast, the Greenwich Observatory with its very modest endowments was separate from the Royal Society, even though several of those consulted were Fellows as were the architect Wren and the first Observer, Flamsteed, and even though the Society actually lent instruments to be used there.

In spite of all the Council could do, the arrears continued to mount. At the 1672 audit they had reached the 'vast' sum of £1,818, or more than ten times the Society's total expenditure for that year. Part of the trouble was that for a long time the Society clung to its original intention of not debating 'concerning any hypothesis or principle of philosophy' until they had 'a sufficient collection of experiments, histories, and observations'. This intention, so obviously influenced by Bacon's ideas, meant that the interest of the weekly meetings depended upon the performance of a series of exciting experiments, supplemented by interesting accounts from travellers and correspondents and by the exhibition of curious objects.

The necessary high standard would have been difficult enough to maintain with a small and enthusiastic group concentrating on specific problems. As it was, only a tiny nucleus of the large membership took a proper part in proceedings; and with the meetings turning from one topic to the next in 'promiscuous fashion', as Sir Robert Moray put it, it was almost impossible to prevent the onset of boredom and apathy. This in its turn meant that the Fellows felt, justifiably, that they were not getting their weekly shilling's worth, and behaved accordingly; and this in turn meant a further decline in the quality of the meetings.

The vicious circle had to be tackled in terms both of the subscriptions and of the quality of the meetings. The Council meeting of August 27, 1674, saw the problem clearly. 'It was considered by this council', runs a minute, 'that to make the

Society prosper, good experiments must be in the first place provided, to make the weekly meetings considerable, and that the expenses for making these experiments must be secured by legal subscriptions, for paying the contributions: which being done, the Council might then with confidence proceed to the ejection of useless members'.

There was much talk of 'prosecuting the work of the Society with more vigour than had been done of late' of 'providing good entertainment', of 'putting life into these meetings', and of 'restoring the Society'; a list of eminent speakers was drawn up; some of the useless members were expelled; and the arrears were pursued with greater determination than ever before. In 1679 the Council even attempted to give the meetings more direction and purpose, by resolving 'that there shall be some one subject fixed upon for the Society to proceed upon for the ensuing time, as their main work, till they are satisfied concerning that subject'.

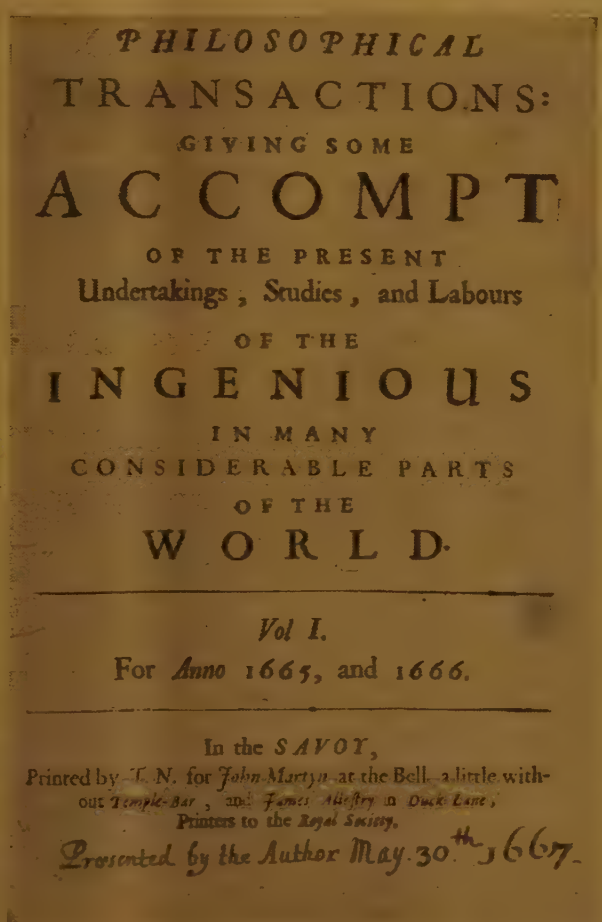
But it was one thing to impose discipline on a professional body like the Académie des Sciences, with a membership of hand-picked scientists drawing substantial salaries; it was another thing to control the poverty-stricken Royal Society, with its ill-defined membership and with power shared between the officers, the Council, and the Society as a whole. The attempted reformation of the sixteen-seventies is symptomatic of what was wrong rather than the occasion of putting things right. In spite of the Council's resolution the meetings were soon as 'promiscuous' as ever—and as badly attended. In 1680 Evelyn was writing to Pepys, reminding him that 'we do not usually fall on business till pretty late in expectation of a fuller company'.

The Council continued to discuss arrears, but when it sponsored the publication of Willoughby's *History of Fishes* the financial loss nearly ruined the Society. Poor Halley was paid his salary in *Fishes* rather than in pounds, and the Society could do no more than offer verbal encouragement while he bore the cost of publishing Newton's *Principia* himself. Perhaps nothing points the financial contrast between the Royal Society and the Académie des Sciences better than the extent of the encouragement the Society was able to offer Halley towards his project for measuring a degree of the Earth. Whereas the Académie had sent out two scientific expeditions within a few years of its foundation, all the Society could do was to promise Halley, if and when he succeeded with the measurement, £50—or fifty copies of the *History of Fishes*.

Sir Isaac Newton: a portrait by Charles Jervas
From the Royal Society's collection

About 1690, the Society reached its lowest ebb. The number of Fellows was lower than it ever was to be, and it was not unknown for a whole year to pass without the President putting in a single appearance at the meetings. In 1687 the Society's journal, the *Philosophical Transactions*, had suspended publication; and Newton's *Principia*, published the same year, was the last book to be sponsored for nearly a decade.

Fortunately the closing years of the century saw a change for the better. In 1690 Sir Robert Southwell was elected President and was re-elected annually for five years. If the Council did not meet often at least the President was almost always there, and at his insistence the *Philosophical Transactions* was resumed. In 1694 Hans Sloane became Secretary; it was after he succeeded Newton as President in 1727 that Fellows were at long last sued for arrears of subscriptions, but long before then his firmness brought about a striking improvement in the finances. But the person who contributed most towards the coherence and prestige of the Society was Isaac Newton himself. During his presidency of nearly a quarter of a century he attended nearly all the Council meetings and most of the ordinary meetings as well; and his rule, together with that of Sloane, saw the Society change from the naïve, exciting, unstable, but above all brilliant company of the seventeenth century into the secure but dull organization of the eighteenth. Only in the nineteenth century was the Society reformed into the professional body we know today.


PHILOSOPHICAL
TRANSACTIONS:
GIVING SOME
ACCOMPT
OF THE PRESENT
Undertakings, Studies, and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD.
Vol I.
For Anno 1665, and 1666.
In the SAVOY,
Printed by T. N. for John Martyn at the Bell, a little without Temple-Bar, and James Allestry in Duck-Lane, Printers to the Royal Society.
Presented by the Author May. 30th. 1667.

Title-page of the first volume (1665-66) of *Philosophical Transactions*, the official journal of the Royal Society

What did the 'philosophers and witts' of the seventeenth century achieve? It has been argued that the universities of the period were not hostile to natural science to the extent that has often been suggested. In Oxford there were, in particular, the Savilian chairs of geometry and astronomy, and Cartesian physics was widely studied in both universities. Roger North, who entered Jesus College, Cambridge, in 1667, wrote: 'I found such a stir, about Des Cartes, some railing at him, and forbidding the reading him, as if he had impugned the very Gospel, and yet there was a general inclination, especially of the brisk part of the university, to use him'.

The universities, officially at least, had a responsibility to encourage reputable and established disciplines. But this could not include the new experimental science, with its naïve enthusiasm for the gathering of facts and its almost morbid fear of premature theorizing. On the other hand, putting Nature to the question (in Bacon's phrase), torturing her into giving up her secrets by the use of experiments—this opened up exciting prospects, and especially for those not tied to the regular

academic disciplines. Even the Civil War and its aftermath had never destroyed the widespread interest in the new philosophy, and the Royal Society, founded in the very year of the Restoration, acted as a focus for the virtuosi and as a centre for the equipment they required; and it offered a fruitful outlet for the restless energies of men like Robert Hooke.

Much of the material of the early meetings was trivial, a result of the failure to realize the limitations of the way in which they went to work. On July 24, 1661, for instance, the Fellows solemnly sat round while 'a circle was made with powder of unicorn's horn, and a spider set in the middle of it, but it immediately ran out. The trial being repeated many times, the spider once made some stay on the powder'—no doubt to see what reaction this would produce from these strange human creatures. But as the years pass, a growing maturity of judgment is discernible.

In 1680, the Society discussed whether experiments 'should be made in order to prove a theory propounded': a modern view, in sharp contrast to the Baconian theory, which all too easily degenerated into mere accumulation of evidence. Admittedly, Sir William Petty was present at this debate to state the old view, saying that the experiments 'would be more faithfully made and delivered, if they were not made to help out a theory, because that might prepossess and bias the experimenter', but the philosophic tide had by then turned. It was, in fact, turning much earlier: thirteen years before, in 1667, Sprat criticized Bacon himself, saying that 'he seems rather to take all that comes, than to choose, and to heap, rather than to register'. The general acceptance of Sprat's criticism put an end to the philosophic turmoil out of which modern scientific method has evolved.

But to turn from philosophy to politics. As a quasi-national institution the Royal Society was in an ambiguous position. The King himself was founder and patron, and many of the lords spiritual and temporal were fellows. From time to time government departments asked for help; and both in theory and in practice much of the Society's time was given to matters of practical benefit: in fact Hooke once goes so far as to say 'They do not wholly reject experiments of meer light and theory; but they principally aim at such, whose applications will improve and facilitate the present way of manual art'. Yet they remained unwillingly, a purely private body largely dependent on internal resources. To the enemies of the new science as well as to its friends, the Society was a national symbol, but it carried this responsibility without the funds essential to its work.

Perhaps the most striking contribution of the early Royal Society was towards making the new science international. The right to correspond with foreigners was granted to the Society by its Charters. Oldenburg, commenting on the duties of the secretary, a post which he himself held with distinction, noted that he 'writes all letters abroad and answers returns made to him, entertaining correspondence with at least thirty persons, employes a great deal of time and takes much pain in satisfying forrain demands about philosophical matters, disperses far and near store of directions, inquires for the societies purpose'. Visitors from abroad were welcome at the meetings, and special rules were made for foreign members of the Society. Much of the time at the meetings was given to reports of voyages and of strange lands, and of the work of scientists on the continent.

Oldenburg's voluminous correspondence landed him in the Tower for a few weeks, suspected of plotting with foreigners against the Government; it also led him to begin the publication of the *Philosophical Transactions*, in which he circulated the most interesting of the papers and letters he had received, either from home or abroad, along with reviews of books and much other useful information. The *Philosophical Transactions*—a private venture at first, although licensed by the Society—rapidly became an international forum, in which scientists might publish short papers and reports, and contribute to discussions. Previously if a scientist wished to publish his work he had no alternative but to write a complete book, with all the delays (and temptations) that involves. Fittingly enough, the most outstanding of the early papers was Newton's announcement of the composition of white light; and its reception indicated how widely the journel was read. His critics included two British Jesuits writing from Liège, and a French Jesuit and the Dutchman Huygens both writing from Paris. Another major contribution of the *Philosophical Transactions* was in publishing the letters of the Dutch microscopist, Leeuwenhoek, over a period of fifty years.

Amid all the vicissitudes of these early decades, the Society, along with its journal, was faithful to its international ideals. As a model for the many scientific societies of the eighteenth century it was overshadowed by the Académie des Sciences. Yet even so, it is perhaps as the institutional expression of the new science—co-operative, partly utilitarian, wholly international—rather than in its actual contributions to knowledge, that the early Royal Society deserves to be remembered.—*Third Programme*

Prospect of Science—1

The Quantum World

By A. B. PIPPARD, F.R.S.

THE everyday world of the modern physicist is the same world that Newton explored, the world whose essential mechanism he revealed in his laws of motion, which are the foundation stones of classical physics. And whenever a physicist or an engineer is thinking about decently large everyday objects, like bridges and dust particles and the solar system, he uses the sort of ideas that Newton invented and used, and never has cause to doubt their validity. Yet those laws of physics, however adequate they may be to describe the world of direct experience and its complex ways, cannot account for its continued existence. The atoms which compose all matter are permanent only because they are governed by different laws, the laws of quantum mechanics. The electron circling round the proton in an atom of hydrogen ought, if it obeyed classical rules, to spiral in and become inextricably merged with the proton. If we could momentarily suspend the laws of quantum mechanics in favour of the classical laws, it would take much less than a millionth of a second for the universe to be wrecked beyond repair by the annihilation of nearly all its matter.

Perhaps it would be as well to make clear at once that there is no question of there being one set of laws for atoms and another set for larger objects. The characteristic feature of quantal behaviour, which allows for stability and permanence of the atoms, is that only certain discrete patterns or structures are permitted, in contrast to the classical conception of a continuous range of patterns. Thus the electron in a hydrogen atom cannot have any value of energy, but only one value chosen from a well-defined set; when it has the lowest of these values it cannot, if left alone, suffer any change, and this is the normal, abiding state of the atom. In principle the same discontinuities characterize the behaviour of large objects, but the permitted patterns are so many, and differ so little from one to another, that in effect they form a continuous range, and the classical mode of description becomes adequate; moreover it is far simpler to apply and to comprehend. Thus the familiar idea that an apparently continuous body is really composed of a myriad of separate atoms has its counterpart in the dynamical behaviour of ordinary bodies. The semblance of continuity is achieved through the sheer number of quanta, that is of separate elements of energy or angular momentum.

But there are some most interesting phenomena which even on the large scale are manifestly governed by the laws of quantum physics. They occur only at very low temperatures within a few degrees of the absolute zero, where all bodies have discarded nearly all their disposable energy and are thus better fitted to

reveal the effects of discontinuous dynamical behaviour. The two outstanding phenomena in this class are superconductivity and superfluidity. Superconductivity is the property which many metals acquire, when cold enough, of carrying electric current without the generation of heat which normally accompanies a current. If a current is started up in a superconducting ring, it will carry on indefinitely without any decrement so long as the ring remains cold. I do not know what the record length of time is, but certainly a current has been maintained unchanged for several months by Professor Collins of M.I.T. This extraordinary phenomenon was quite beyond the range of reasonable prediction when it was discovered fifty years ago by Kamerlingh Onnes in Leiden.

The Right Answer at Last?

It is only in the last few years indeed that anything approaching an adequate explanation has been found. It was clear for some time that there was the possibility of an explanation if one could only show that the energy permitted to even a large block of metal had discontinuities of the same sort as an individual atom, so that the current circulating round the ring was rather like a huge analogue of an electron in its atomic orbit; but it proved to be a matter of great difficulty to see how this could possibly come about. Recently Professor Bardeen and some of his colleagues at the University of Illinois have propounded a model of considerable complexity which has aroused great enthusiasm, and which seems to be the right answer at last, although there is a lot of detailed checking to be done yet.

The basic idea here was due to Professor Fröhlich of Liverpool. Normally one expects two electrons, both negatively charged, to repel one another, but he realized that in some metals the fastest-moving electrons could so distort their immediate surroundings as to introduce an attractive force which more than compensated the repulsion. The existence of a net attraction enables the electrons to condense at low temperatures into a new state. The word 'condense' conjures up a picture of a gas condensing into a liquid, which is not in fact at all an exact analogy. But it is the nearest I can think of among ordinary phenomena. Professor Bardeen and his colleagues have now shown that the structure of the condensed state of the electrons has the desired property of superconductivity, because it cannot absorb energy continuously but only in well-defined quanta like a single atom.

But let us pass on now to the second, and superficially more striking, phenomenon of superfluidity, which is found in only one liquid, helium, at all temperatures below about 2 degrees absolute. Superfluid helium can flow through extremely narrow channels without friction. There is no better way of seeing if a vessel is vacuum-tight than to immerse it in superfluid helium, which will get through a crack too fine to admit any measurable amount of gas. It is a wonderful conductor of heat, hundreds of times better than silver, the best conductor at ordinary temperatures; and it will also flow freely in a very thin film over any surface immersed in it, so that a beaker full of helium empties itself by the liquid flowing up and over the rim and dropping off the bottom. But it has another less obvious property. If you try to spin the liquid by turning the vessel that holds it, it does not rotate like ordinary liquids but in a quite extraordinary way. If we use a very small vessel, about a millimetre in diameter, and make it revolve very slowly, once every few minutes, the helium does not go round uniformly like any other liquid, with each particle moving at a speed proportional to its distance from the middle. Instead each particle has a speed *inversely* proportional to the distance from the middle, so that there is a central core which is spinning fast, and the outside bits go very slowly.

Bath Water and Liquid Helium

This is, on a minute scale, the same as happens when you let the bath water out and get a vortex round the plug hole, but the hole down the middle of the helium vortex is not something you can put your finger in; it is more like the size of a helium atom. The depression of the surface round the core of the vortex has never been seen, and is only barely within the range of the best microscopic techniques, so that no one has yet been bold enough to spend a lot of time looking for it. But apart from size (and of course temperature), there is another, and much more interesting, difference between your bath water and my liquid helium. The vortex in your bath can spin at any speed, depending on the size of the plug hole and the depth of the water, but the vortex in helium is quantized, and has only one permitted speed, such as makes the angular momentum of a helium atom around the core of the vortex just equal to Planck's constant.

Let me expand this statement. By the angular momentum of a helium atom I mean the product of its mass, its speed and its distance from the core. If this is to be the same for all atoms it is clear that the speed must vary inversely as the distance, which is how this law of rotation arises. The actual permitted value of the angular momentum is the fundamental constant of nature which Planck first introduced into the theory of radiant energy. It also determines what energies an electron in an atom can have; in fact whenever we abandon the classical, continuous picture of things and deal with discrete, quantal effects, Planck's constant always enters in.

To return to our rotating helium: Dr. Vinen has carried out a delicate and very beautiful experiment at Cambridge to show up the high rotational speed near the core of the vortex by its effect on the vibrations of a fine wire stretched vertically along the core. If the wire is twanged so as to vibrate in a north-south plane, within a quarter of a second the plane has swung round to east-west, and goes on steadily rotating about once a second; and this in spite of the fact that the vessel is turning only once in several minutes. Dr. Vinen has gone further and shown that the rotational speed near the wire always has the same value, irrespective of the exact speed of the vessel. In fact he has demonstrated conclusively the quantization of the vortex, and he has been able to measure Planck's constant with an accuracy of about 3 per cent. I think this is the only experimental determination of Planck's constant achieved by observations on comparatively large objects, and it illustrates the irruption at low temperatures of characteristically quantal behaviour into the realm of things one can touch and see.

Facts Catching up with Theory

Something of all this was predicted before it was actually discovered. The basic theory, begun by the Russian, Professor Landau, and extended in America by Professor Feynman, had for once got ahead of the facts. But the facts have now caught up and there is good enough agreement between theory and experiment for one to be fairly happy that the heart of the mystery has been penetrated. I cannot give any idea of this complex theory in a few words. But it seems to me that the two classical enigmas of low temperature physics, superconductivity and superfluidity, have yielded their secrets. There is much tidying-up yet to be done, and many far from straightforward experiments to be carried out which will keep physicists happy for some years; still there is a twilight feeling in this field, and among low temperature physicists who have devoted their lives to solving these problems one sometimes detects paradoxically an air of melancholy now that the desired-for end is in sight. For these problems were set apart from the general run of topical problems in physics by the peculiar character of the phenomena, which were at once simple and mysterious, but perhaps above all by the special low temperature techniques needed to study them. So that we low temperature physicists had come to think ourselves members of a rather exclusive club, united by a special *esprit de corps*, and sometimes maybe we thought of the low temperature aspect of the problem as its primary attribute, and only secondarily took notice of its relation to the wider world of physics. It is, I think, a good thing that we have been compelled to abandon this narrow view, and I am happy to think that there is a corner of physics which may soon be satisfactorily cleared up, so that the lessons we have learned in the process may be incorporated in our general philosophy, and the details of the efforts and inspirations and mistakes by which we learnt may have decent interment in the histories of the science.

But if these beautiful problems have been to the low temperature physicist the cherry on the top of the cake, there is still a good deal of very palatable cake left. For instance, in reaching out to solve the problem of liquid helium, we have largely passed over the less spectacular but more important problem of liquids in general. The more one thinks about them, the more curious they

seem to be: if one had not known of them one would not have predicted them; gases and solids, yes . . . they are made up of comprehensible arrangements of atoms, but liquids—nearly as dense as solids and yet so lacking in orderly packing of their atoms—present a real puzzle, to which we shall not find a full answer quickly. Recently, Professor Bernal in London has been studying the geometry of random packing and has proposed a model of a liquid in which each atom is surrounded by a nearly orderly array of others, but not so orderly that it can be said to have anything like the regular pattern of a solid. Certainly what he has achieved so far has been at least a splendid intellectual exercise; probably much more. I believe he is showing us a very profitable line of advance, though he would be the first to admit that there are formidable obstacles still to be overcome. But here at any rate is scope in the future for as much ingenuity of thought and experiment as has gone into the helium problem.

In a similar way, concentration on the superconducting properties of metals has taken attention from serious gaps in our general picture of how electrons carry currents in metals and confer on them all their other characters. Of recent years it has become clear that there are many low temperature experiments which can be particularly enlightening on just these points, and we are bending much of our effort in Cambridge to the task of bringing this matter out of the penumbra of theoretical speculation into the light of hard facts.

I have mentioned these problems because they are of particular interest to me, but there are many others which are being studied and doubtless still more will appear in the course of time. This sort of physics, which seeks to show how phenomena of great complexity are to be understood as springing from a few fundamental laws, is in a sense the normal sort of physics, the low road which is travelled by all but the supremely gifted and fortunate. The high road is the way of Newton and Maxwell and Einstein, the men who extended the bounds of the known world, the creative artists whose achievements rank with those of Shakespeare and Socrates and Bach. But the great majority of us must be content if we can just enlarge the view of our colleagues: we cannot hope to change the thought of mankind as a whole. And it is as one professional to another that we shall speak when we say, as I hope we shall say soon, that we have understood the problem of electrons in metals. We shall have discovered no new laws, but we shall have gained insight into the working out of the old laws.

What we aim to discover is a technique of thought which will make it unnecessary to go back every time to the extremely complicated equations which give exact expression to the basic laws. Perhaps the best way of explaining what I mean is to say that we are trying to replace the real metal, which we cannot hope to treat mathematically, by a model which is amenable to simple calculation and yet which always gives a good enough answer. If the model is simple enough we may be able to guess without calculation how it will behave, and then we can say that we have really understood the problem. We can teach our new technique of thought on this particular problem to our successors, and if we do our job well they will be unable to understand how anybody could think differently about so simple a matter. This is our highest reward, to see our strivings forgotten and our conclusions accepted as obvious. Such an end may not always give us pleasure, but then we have had a great deal of pleasure on the way.—*Third Programme*

Prospect of Science—II

Matter and Sub-Matter

DENYS H. WILKINSON, F.R.S., discusses a problem at the heart of physics today

TO be aware of something we must be connected to it by a chain of interactions. Listeners to this broadcast talk are connected to me by a sequence of pressure changes, mechanical movements, the flow of electrons through wires and through the vacuum of electronic valves, and by the radio waves between the antennae of the transmitting and receiving sets. From my awareness of myself to the listener's awareness of me stretches a complex sequence of causes and effects each representing some form of interaction of one element of the physical world with another. Carrying out an experiment is always an attempt to find out about some sort of interaction. We produce this interaction in as simple a form as we can, and then connect it to ourselves by a chain of other interactions that we already understand well, if only empirically, and so which bring to us in an intelligible fashion news of the interaction that we are trying to study at the other end of the chain. Sometimes the object of our study is a very simple interaction such as the collision between two electrons; sometimes it is a complex of interactions like the germination of a seed. But whatever we study must interact with the tools of our investigation, and they with us.

It seems that there is no end to the variety of the interactions that tell us about, and make up, Nature: just as there is no end to the variety of Nature herself. But this is profoundly false. Every interaction that I have mentioned, every interaction that makes up the whole of chemistry, biology, metallurgy, medicine, almost the whole of science and technology, is basically the same, the inverse-square interaction between electric charges. An atom is held together by the electric interaction of the positively charged nucleus with the negatively charged electrons; and a pint of beer is brewed, bought, and drunk by virtue of the same interaction. Behind the endless variety of the natural world, and responsible for it, lies the simple inverse-square electric interaction. We can easily imagine a universe containing no other interaction, a world in which not only the whole of chemistry but the whole of everything was due to the electric interaction. This universe would be governed by a single sort of physics, the physics of electric interaction.

But the world is not as simple as it might have been, and there exist other sorts of interaction than the electric. One of these is very familiar to us and we owe a great deal to it: gravitational interaction. If only the electrical interaction existed, at a large distance, electrically neutral matter would not interact with other matter at all. Some interaction does take place, however, in these circumstances: the force of gravity. Were it not for gravitational interaction, atoms would not condense into gas clouds; there would be no stars, no planets, for human beings to evolve on. This, then, is another sort of physics, the physics of the gravitational interaction. So far as we are aware at present there is no connexion whatever between gravitation and electricity. Indeed there is no evident reason why the two interactions should be associated with the same objects; why, say, an electron should interact with another electron gravitationally as well as electrically. A simpler world would have contained two separate classes of entity—electrically interacting entities in one class and gravitationally interacting entities in another—a member of one class having no interaction whatever with any member of the other. We should then have two completely interpenetrating but non-interacting universes.

But nobody could know this because, by definition, any entity such as a scientist would have to be either wholly electrical or wholly gravitational. So the all-electric scientist would have no means of finding out about the gravitational universe or the existence of his all-gravitational colleague. However, although a world of electric but no gravitational interaction could contain atoms and molecules we cannot see how life could develop without those same atoms interacting also gravitationally with each other to produce stars and planets. So an all-electric scientist could not have come about. Notice that life does not depend in any essential

way on the gravitational interaction. We do not depend on gravity to hold us together. In other words, it is the fact that a single entity interacts both gravitationally and electrically that gives the natural world its present form.

The gulf that separates electric from gravitational interaction is quantitative as well as qualitative. For example, the electrical force between two electrons is greater than the gravitational force by a factor of about ten million million million million million million.

Importance of Gravitational Interaction

In the cohesion of everyday household objects such as apples and skyscrapers, the gravitational interaction plays an utterly negligible part. For us its importance arises because the exceedingly feeble intrinsic interaction is enormously multiplied up by the great mass of the earth. No similar situation arises for electric interaction because large bodies are always electrically neutral or very nearly so. There is, as far as we know, no analogue of electrical neutralization for gravity, no sort of matter that is repelled gravitationally by ordinary matter rather than attracted. But we cannot rule out this possibility, and it may be that antimatter such as the positive electron and the negative or antiproton is gravitationally repelled rather than attracted by ordinary matter, although the present scanty evidence is to the contrary.

The radicalism of this last possibility leads me to a further point. I have stressed that we do not understand why gravitational and electric interactions are enjoyed by the same entity. Granted that they operate simultaneously for a single body, we must still ask whether the laws of nature governing the behaviour of matter under gravitational interaction are the same as those governing the behaviour of that same matter under the electric interaction. Since gravitational and electric-interaction physics are so totally different there is no logical reason to suppose that they will be governed by the same laws of nature, strong as our prejudice in favour of such uniformity might be. Ordinary laboratory experiments in mechanics are investigations of the behaviour of matter under electric interaction; from them we learn the physical laws of electric interaction: for example, that energy, momentum, and angular momentum are conserved. Do the same laws hold good for gravitational physics, for example celestial mechanics? It turns out that they do. But let me stress that we ought to be surprised about this and not take it for granted. The carrying over of a law of physics from one interaction to another is always unjustifiable except under experimental test.

It is clear that our list of sorts of physics—of different interactions—does not end here. The nucleus of an atom consists of neutrons and protons, packed tightly together. The protons are positively charged and the neutrons are neutral, so the electric interaction between the protons is tending to blow the nucleus apart; the feeble gravitational interaction is powerless to hold it together but something else obviously does. This is a new sort of interaction: not electric, not gravitational, the nuclear or, as it is called, 'strong' interaction. It is obviously stronger than the electric interaction because it overcomes it; it is in fact about a hundred times stronger. Again we must ourselves be grateful for its existence because without it no complex nuclei could be formed and the universe would consist entirely of hydrogen.

The World Begins to Look Stranger

The emergence of life, then, depends on all three of these interactions, electric, gravitational, and strong, and it also depends on all three being simultaneously enjoyed by the same entities. If we ask whether the strong interaction also conserves energy, momentum, and angular momentum the answer is that it does. Again the laws of physics seem, for no evident reason, to be the same, independent of the interaction. But, as we have been expecting all along, at this stage some variety has come in. Some entities, although they have both electric and gravitational interactions, have no strong interaction. The proton joins in all three different sorts of physics that we have discovered so far, electrical, gravitational, and strong interaction physics. But the electron joins in only two of them: strong interaction physics passes it by. Already the world begins to look stranger.

A fourth type of interaction brings us to a world that is almost bizarre. It is the so-called 'weak' interaction. This is some million million times weaker than the strong interaction although it is itself enormously stronger than gravity. So far as we know it is enjoyed by all particles. If a process can take place through the strong or electric interaction it will do so, and the contribution of the weak interaction is totally negligible. There is, however, one particle, the neutrino, that has no strong interaction, no electric interaction, and for that matter, since it has no mass, no gravitational interaction. It exhibits only one sort of physics, weak interaction physics. How weak this is can be illustrated by imagining a neutrino coming from the Sun to enter the Earth vertically at the equator. The chance that the neutrino will not emerge unscathed from the other side of the Earth is less than one in a thousand million. Neutrinos do in fact pour out of the Sun and about a hundred million million of them are passing through one's head every second. One need not worry. This is almost my earlier picture of two completely interpenetrating universes each ignoring the other. Not quite, because they are weakly coupled through the weak interaction. When these wraith-like neutrinos, having only weak interactions, are involved in a process, that process obviously takes place only by virtue of the weak interaction and so goes very slowly, roughly a million million times more slowly than if the neutrinos had enjoyed strong or electric interactions.

A New Class of Particles

To our amazement, some fifteen years or so ago, it was discovered that there exists a class of particles, the so-called 'strange' particles, that enjoy strong interactions and that change into other particles also enjoying strong interactions but at a rate less by this same factor of about a million million than predicted from strong interaction physics. In other words, they appear to decay, as we say, through a weak interaction even though all the particles involved are strongly interacting. This is the sort of thing, a discrepancy by a factor of a million million in his calculations, that shakes a physicist to the core. He gets out of the difficulty by inventing a new law of nature to cover his confusion and ignorance; but he does not say he has invented it, he prefers to say that he has discovered it. In the present case we simply say that these new strange particles do not decay through the strong or electric interactions because there is a law of nature obeyed in these interactions that says that they do not. This same law of nature, however, does not hold in weak interactions, so the decay takes place through them but only very slowly. This is our first example of a law of nature that is true for one interaction but false for another.

A second law of nature that is true for strong and electric interactions and seems almost to be common sense is that of mirror symmetry: if a given physical situation is possible, so also is its mirror image—a left-handed golfer looks exactly like a right-handed one seen in a mirror, and if I did not know whether or not a mirror was there I should not have any way of finding out by watching the shot. But this law, true for strong and electric interactions, is false for weak interactions. Nature in her weak interactions is always either right-handed or left-handed and never impartially ambidexterous. In other words, astonishingly, the weak interaction defines a sense of screw.

There are several other examples of laws of nature that are both true and false depending on how we test them. One is the law of charge conjugation which says that if we take any physical system and replace all the particles by their anti-particles, then that new system is also physically possible. This law holds for strong and electric interactions but again is totally false for weak interactions. Another law of nature concerns a quantity known as the isotopic spin of a system of particles, which is conserved in the strong interactions. It is not conserved, however, either in electric or weak interactions. The law, so far as we can tell, is absolutely true for one interaction but completely false for two others.

We have then learnt two important things: first, that there exists a hierarchy of interactions in nature, each defining its own sort of physical world, and that these worlds overlap only rather incompletely through the residing of more than one type of interaction on a single particle. Secondly, that the laws of nature are

not general and of universal application, but that their validity depends on the interaction against which they are tested.

Out of our study of sub-microscopic matter comes a new and humbler perspective on the natural world. There are so many things that we do not understand at all. Some of them I have indicated as we have gone along. Others are equally baffling: why is electric charge divided up into units that are always the same to within at least one part in a million million million? Why does a proton last for at least a million million million million years, whereas our present theory would predict that it should decay in a millionth of a millionth of a millionth of a second? We do not know. And while we do not know we must question whether our present list of four interactions, four sorts of physics, is complete. May there not exist other interactions of a sort that have so far not revealed themselves, either because they are very weak or because, while being strong, they are not enjoyed by the stable particles that make up our ordinary world but only by the transient particles that we produce in such small numbers and with such pain around the great accelerators? So long as we do not understand the origin of the four known interactions and the relationship between them, why some reside on some particles and others on others, we cannot claim that the list is complete and must rather expect otherwise. The search for an understanding of these interactions and relationships is the heart of physics today, a chapter of human endeavour that is scarcely begun.

Perhaps there do indeed exist universes interpenetrating with ours; perhaps of a high complexity; perhaps containing their own form of awareness; constructed out of other particles and other interactions than those that we now know, but awaiting discovery through some common but elusive interaction that we have yet to spot. It is not the physicist's job to make this sort of speculation, but today, when we are so much less sure of the natural world than we were two decades ago, he can at least license it.

—Third Programme

Further talks in the series 'Prospect of Science' will be published next week and in later numbers of THE LISTENER.

Has Mr. Kennedy the Gift of Leadership?

ALISTAIR COOKE reflects on the U.S. Democratic Convention

THE thirty-third Democratic Convention—the first was held in 1832—came to an end on July 15 with the traditional acceptance speeches of the two picked men: Senator Kennedy for President, Senator Lyndon Johnson for Vice-President. It is, incidentally, the first time in history that either party has put up two Senators on the Presidential ticket, a point worth pondering. But we will ponder a little later; at the moment we are still recovering from the assault on our nerve ends. There is always tumult and shouting at Conventions, but this time the old phrase has a special point. The tumult was in the South, and the shouting was from the galleries. Put it another way and say that the chief excitement of this Convention, and the main anxieties it will have to conquer, came from the brief rebellion in the South against Kennedy's choice of Johnson as running mate, and from the fact which was dinned into our ear-drums two nights in succession that the only figure who stirred the place to passion was Adlai Stevenson, and that the stirring was done in the galleries where the public sits, which can bawl itself hoarse but which has no part in the Convention other than the sheer vocal pressure it can bring to bear on the Convention down on the floor that is unsure of itself.

In the main this Convention was as sure of itself as any since the series of festivals every four years in which Roosevelt was the towering 'champ' and nobody looked anywhere else for leadership. Jack Kennedy from Massachusetts, this boyish figure of forty-three winters, is a cool, strange creature of great ability, settled idealism, and an unruffled awareness that the real world is frightened by Khrushchevs and Nassers and by the ferment of Asia and Africa.

First-class Political Artist

What is more to the point, he is a political artist of the first class. He could teach a great deal about political organization and political campaigning to any leader of the Western world. I hear you begin to say: 'I suppose he built the Panama Canal single-handed?' I am saying this as dogmatically as I know how because I am trying to describe the real abilities he has, partly because the people who have not seen him out on the stump greatly underestimate him. I am saying it because his knowledge and his political skill seem to be contradicted by his appearance, and by a popular image that will soon be familiar to the western world. He has, for one thing, all that ropey hair which grows like a wall-to-wall carpet from the nape of his neck almost to his eyebrows. He has a brownish-yellow complexion and heavy eyelids, and gives the entirely false impression that he is sluggish or complacent. It is difficult to cast him on sight as a villain, but his enemies—and they are vocal people—have done it. They shudder in public at what they call his merciless pressure on politicians that he is eager to embrace; his ruthless tactics, usually unspecified; his mid-century type of public relations. He has been called not a leader but a technician, and his political machine has been called as efficient and as inhuman as a meat-grinder—or better, since it is a machine in which thousands of cogs mesh and synchronize, an electronic brain.

Two of a Kind?

I have noticed that when you drop in on a party of politicians and you hear people trying to grasp at suitable images with which to pin Kennedy down, you are not quite sure at first whether they are talking about Vice-President Nixon. One hears from Democrats who are deeply disappointed over their party's ticket that Kennedy and Nixon are two of a kind. I do not believe it because I do not believe any two men, or two women, are two of a kind: you have only to marry a couple to see in no time how wildly any two similar human beings, with the possible exception of identical twins, can vary in character, temperament, whimsy, and dullness. But what these critics mean is that Kennedy and Nixon are two similar types of this century and no other; that they believe deeply—if it is possible to believe deeply—in organization, in public relations, in leaving nothing to chance, and in contriving policies and managing affairs by the use of the brain.

I do not want to praise or malign Mr. Nixon just now (that opportunity will come up at the end of the Republican Convention in Chicago), but so far as this characterization of Senator Kennedy applies, it misses the point that he does feel deeply about the things all politicians talk about—poverty and slavery and liberty and unnecessary disease and the prospect of a nuclear war—but that he is most sure of himself when he decides how far his feeling can guide his reason. He has learned, for instance, at first hand as well as from his experts, the huge ordeal of India, and he probably thinks it is sentimental, that is to say vulgar, to sit and shudder and express his sensitive feelings about the poor and the diseased. He asks, in a voice that masks this distaste, what can we usefully do? If he finds no answer he goes on to another problem. If he has a solution he then exerts power to apply it. So far, he has not had the power on the national scene to let us see how wisely he can use it. The trouble here is that voters in a democracy do not look a man over for symptoms of wisdom. They look for passion and humour and the conspicuous exercise of patriotism. Of all these qualities Senator Kennedy has, so far,

shown little or no evidence. By passion I do not mean anger; and by humour I do not mean wit. I mean the power to communicate to masses of people a sense of gallantry and compassion. I mean the off-hand admission that people are queer fish, yourself as much as anybody.

Because Senator Kennedy does not have, or if he has them has rarely shown, these gifts, he did not project—for all the printed eloquence of his script—on to the last session of the Convention or, I imagine, on to the millions who watched him, the feel, the presence, of sensitiveness and passion, that is to say, of leadership.

Adlai Stevenson has these qualities, and they were so lacking in all their booming parodies at this Convention that when he came into the arena to take his seat in the Illinois delegation he was carried into the place on a wave of adoring outsiders and landed up on the platform, a place where candidates are never supposed to appear. Indeed, they are not supposed to come near the hall during a Convention, but Stevenson maintained to the end the fiction that he was not a candidate, and it was as a delegate that he got on to the floor and as a beloved old leader that he was swept up to the rostrum. The Stevenson fans were never the delegates, who shivered months ago at the defeatist idea of running for a third time a man who had lost so resoundingly twice before. Though if Stevenson had given the word last week he might have split New York and Michigan and Minnesota and blown the Convention sky high. He never gave the word.

Senators John Kennedy (left) and Lyndon Johnson, photographed in Los Angeles after the Democratic Convention had elected them respectively as Presidential and Vice-Presidential candidates

The Stevenson fans were the bitter-enders, the footloose young Democrats and ordinary people of Los Angeles who wanted to see him, and who had been well supplied with placards and banners. They got him to the hall and so started the demonstration for him because the Governor of California was horrified to see on the first two nights that the arena galleries were never more than half filled. He requested permission of Mr. Butler, the National Chairman, to let them in, so they came in and they bellowed themselves into mania and gave the entirely wrong impression that Stevenson was the true leader and might have swept the Convention in an orderly way, if it had not been for the diabolical cunning, the passionless efficiency, of the Kennedy managers in capturing and seducing delegates from all over the country, so that by the time they got to Los Angeles they were mindless vegetables, flotsam and jetsam in the vortex of the Kennedy brain-washing machine.

It is a grotesque misreading but it showed up by contrast that the people who take to Stevenson love him, and respond to him from the heart. Whether Senator Kennedy can acquire this power is something between him and his secret self.

The tumult on the floor on July 14—it was an invisible intramural sort of tumult—was among the ten Southern delegations that had protested against the passage in the party platform that declared, and promised to enforce, the rights of Negroes to vote, to share public housing, to have equal jobs and other rights guaranteed in the beautiful, vague words of the Constitution. The South had voted for Johnson, the man from Texas who, they believed, would, when it came to the pinch, uphold the Southern way of life. When Johnson went down to defeat before the Kennedy earthquake on July 13 the Southerners looked at that civil rights passage and had the consolation of saying: 'Well, we may have lost our man Lyndon, but at least he won't have to associate himself with that obnoxious, that obscene plank'—those were the actual words.

It is not hard to imagine their bewilderment when Senator Kennedy picked Lyndon Johnson as his Vice-President. Johnson had sworn to his friends he would never take the offer. Like all other men who are offered it, he took it. The South felt their man Lyndon had betrayed them, and the liberal Northern States—Michigan and Minnesota especially—felt that Kennedy had betrayed them by appointing Johnson, whom liberals and labour leaders regard as an incurable Southerner, a reactionary and several other things he is not. It was by his management and nobody else's that the Senate recently passed the only two civil rights Bills since the Civil War. As always at a Democratic Convention, the threats were empty and the rebels cooled off, and they raised their voices in a big, raucous, sentimental sound that is meant to be identified, by people with something less than an ear for music, as harmony. The question is, however, not will the delegates stay with Kennedy and Johnson but will the Southern people vote for them in November?

There is one other point, the point to ponder that I mentioned at the start. For the first time in American history we have two Senators making up a Presidential team. It used to be said that Senators were committed men, whose votes in the Congress were known to the people and made them admired here and hated there. It used to be said that the Governors of the States, because their job was the Presidency in miniature, were the only ideal and practical candidates for the White House. Nowadays, it seems, the Governors are simply men engrossed with their local affairs, provincial chieftains like mayors or Lieutenants of the County. The roar out of Asia and the echo of the big bomb have made us all realize that our safety, our destiny, is in the keeping of the men who sit in the great national assembly of the Senate, as the leaders of all the other democratic countries sit in Parliament. The eighteenth century came in to a minuet, and the nineteenth century to the violins and love-lorn cries of the romantics. As far as this country is concerned the twentieth century arrived in the person of two young men, both callow, both neat, both cunning, and both as impersonal looking as an actuary or a man in a space suit.—*Home Service*

Great Parliamentary Occasions is the title of a new book by Mr. J. Enoch Powell, M.P. (Herbert Jenkins, 13s. 6d.). It contains twelve descriptions of famous parliamentary events from 1376 until 1927. These were originally written for broadcasting in the B.B.C. series 'Under Big Ben' and first heard by listeners to the English Service to Europe.

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F. L. Carsten, whose book *Origins of Prussia* appeared in 1956, is the author of *Princes and Parliaments in Germany, from the Fifteenth to the Eighteenth Century* (Oxford University Press, £2 10s.). In this new volume, Dr. Carsten considers the parliaments of the most important principalities—Bavaria, Würtenberg, the Palatinate, Hesse, Saxony, Jülich, Berg, Cleves, and Mark—from their origins to the end of the *ancien régime*. An account of parliamentary development in Brandenburg-Prussia was included in Dr. Carsten's earlier book.

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A volume on German Affairs, 1920, has been added to the first series of *Documents on British Foreign Policy 1919-1939* (H.M.S.O., £3 10s.)

The Magistrates' Duty to Protect Children

By BARBARA WOOTTON

SOME of the most difficult cases that magistrates have to decide are those in which there is some question of interfering between parents and their children, or even of taking children out of the care of their parents altogether. Such cases come up in various ways, and all of them are likely to cause much heart searching. Of course, if a child has committed serious offences, if, for example, he persistently steals or commits acts of violence, the issue may not be too difficult. For then it may be the clear duty of the court to protect other people, by sending the offender to a place of safety, and, at the same time, doing whatever they can to get him taught to behave differently.

Children Needing Specialist Treatment

Unfortunately, some children can be dangerously violent, though happily this is very exceptional. I remember a little girl only about twelve years old, with an innocent, chocolate-box prettiness, who got hold of a smaller child from next door, shut him in a room, locked the door, and turned the gas on, knowing perfectly well what she was doing. Children such as this obviously need specialist treatment, though unfortunately we do not always have specialists able to treat them. Even in these cases, however, and even where, as often happens, the parents fully appreciate the need for the court's decision, there is bound to be much distress. It is a terrible thing for any parents to bring their child to court, and then go home without him, because, as they are so apt to express it, he has been 'put away'.

Another type of case in which there is generally little doubt about what ought to be done is that of the parent who will not send his child to school. Occasionally, one comes across very conscientious parents who honestly believe that the education they give their children at home is much superior to that provided by the Education Authority, but who nevertheless fail to convince the powers that be that this is so. These cases generally receive a good deal of publicity, and many of us perhaps have a sneaking sympathy with at least some of them. But they too are most unusual. People who keep their children out of school more often do so for their own convenience, rather than in deference to any high-minded theories about education. And I think most magistrates would agree that parents who get into trouble over school attendance are generally drawn from a rather depressed and unsuccessful section of the community. Perhaps their own schooling did not bring them much good, and they see no point in enforcing attendance on their children.

Problem of the Truant

The children who themselves play truant present rather different problems. They are a mixed lot: some of them are just rebellious and difficult. In an earlier generation they would have been called 'naughty', instead of, as today, 'disturbed'. Some of them have been teased or bullied at school, perhaps because of some physical peculiarity. The fat boy, or alas, the boy with signs of Asian or African ancestry are common examples. But in any case once a child has missed a good deal of school it is extraordinarily difficult for him to face going back. He will have fallen behind the others, and he will be conspicuous. In these circumstances I have found the attitude of some headmasters, who seem to think that the returning truant should be greeted with the cane, utterly incomprehensible.

A few of the truants, I suspect, are the salt of the earth. Such will be found among the wandering children—those who are entranced by this exciting world, and who take long bus rides, or try to stow themselves away on ships, and do not give a fig for the dreary routine that adults try to impose. I recall an Irish boy in this category, who when he was asked what he would do for a living if he grew up without being able to read or write, cheerfully replied that he would beg, 'like they do in Ireland where they give you a penny and a piece of cake'. But unhappily both the physical and the human environment of our cities is far too dangerous for such children to be allowed to go on their adventurous way. For them there is no alternative to the residential school. But their parents, far from objecting, are generally immensely relieved when they are sent there. Indeed the parents themselves often take the initiative in bringing these children before the court, as being beyond their own control.

Much more difficult decisions are those which concern the children whose parents, in the words of the 1933 Children and Young Persons Act, are not exercising 'proper care and guardianship', children who are thought to require care or protection, because they are the victims of neglect or cruelty, or exposed to moral danger. These cases are generally brought to the Juvenile Courts by the police, preferably by a woman officer, or possibly by the National Society for the Prevention of Cruelty to Children or by the local authority; and if the magistrates are satisfied that the child actually is in need of care or protection within the meaning of the Act, various courses are then open. They may, for example, exercise their power to commit the child to the care of what is called 'a fit person'. This means, in effect, that the rights and the duties of guardianship are compulsorily transferred from the parents to this fit person, who in most cases will be the appropriate local authority acting through its children's officer. These cases are not numerous: out of a total of over 40,000 children received into the care of local authorities last year, only some 3,300 were committed under such orders. But if no other action is taken, children so committed will remain in the care of their new guardians, no matter what their age when the order was made, until they reach the age of eighteen.

Cancelled Orders

They are, however, unlikely to stay that long, for a parent has the right at any time to ask the court to revoke the order, which it may or may not agree to do, and to return the guardianship to him. And a great many orders are, in fact, thus cancelled after perhaps a year or two, or even sooner if there has been some favourable change in the child's home circumstances. But in the meantime we are plainly up against some tricky problems here. 'I love my Mummy, but I wish she did not drink so much', says a ten-year-old who, with his sister, is managing the household with a remarkable degree of competence. Would he or would he not be happier in a children's home? Sometimes a frightened child runs away to a relative or neighbour, who proves to be willing to keep him indefinitely. The child clearly wants to stay there where he feels happy and safe, and the court may be satisfied, through a social worker's inquiries, that there is no evident reason why he should not. But any suggestion that this relative should be given rights of guardianship as a fit person may evoke threats of dire vengeance from an irate parent, who cannot see any reason why the child should not at once go back to his own home.

Cruelty and neglect are themselves matters of degree, and it may be no easy matter to decide whether the situation justifies removing a child from his home against his parents' wishes, and sometimes apparently against his own. And this is particularly difficult when, as often happens, the parent himself is most emphatic in his promises to change his ways.

Still more difficult are the cases of moral danger, so called, or of children living in households a member of which has been convicted of certain sexual offences. I suppose in one sense it could be argued that the whole of life is just one long exposure to moral danger, at any rate from the time that one is old enough to get around at all. But for the court to intervene some specific danger has to be proved. A child whose parents have been con-

victed of keeping a brothel; a girl whose father has been found guilty of incest with an older member of the same household, or whose mother practises prostitution in the home: these might appear to be clear cases. Yet even in these cases (and I have seen many such) one may well be in doubt as to whether any moral danger arises if the child is not old enough to know what is going on. And if one takes the view that it does not, then what, for this purpose, should we call the dangerous age? Brothel-keeping parents and mothers who bring men home sometimes look after their children remarkably well in a material sense, and are very fond of them, and the children too are often happy and well, and well behaved. The prospect of a break-up of the family, even for a few months, in order perhaps to establish that the brothel has become a perfectly respectable hotel or that the prostitute mother has given up her profession, may create the utmost distress to the whole family. Ought we nevertheless to insist on it?

Again, for a child to be dealt with as in need of care or protection it has to be proved that his parent, if he has one, is failing to exercise proper care and guardianship. Here we have a further source of difficulty, particularly with the runaway adolescents who make up a large proportion of these cases. A girl (it is less often a boy) runs away from her home in the provinces without a word to her family, makes her way to London, and is put in touch with some dubious club in the West End (there seems to be a remarkably efficient underground for guiding her there). There she obtains an equally dubious job as what is called a 'hostess'. Meanwhile, having searched the neighbourhood frantically, the parents notify the police that their daughter is missing. Sooner or later she is traced, and brought before the court as in need of care or protection, and the parents tell their sorrowful tale. Sometimes it comes out that they had no idea what their daughter had been up to, but sometimes there is a history of adolescent rebelliousness—keeping company with the wrong sort, staying out to all hours, and so on. In either case, it is often clear that the parents have really done their best. Yet they have certainly failed to exercise effective, if not, as the Act says, 'proper', care and guardianship, and they perhaps are more appalled than anyone else at what has happened. Perhaps they have not been very wise, perhaps they have been too strict, or not strict enough. It is easy enough for the rest of us to pass judgments of this kind.

One is reluctant to have to record in a court of law that parents who have done their best have nevertheless failed to exercise proper guardianship. As so many of them themselves say, you just cannot be behind your children all the time. And particularly in the case of the runaways, the often tearful protestations of both the girl and her parents that everything in the garden will be lovely, if only she is allowed to return home, are very hard to resist. And yet experience suggests that all too often in these cases history repeats itself; and one cannot shut one's eyes to the fact that the consequence of a second breakdown for a girl who has perhaps had a taste of life on the streets may be disastrous.

I must now say a word about the problems that arise in adoption cases. Here, obviously, the welfare of the child to be adopted cannot be the only, or indeed even perhaps the primary, consideration. Parents have their rights too. I suppose if we looked round our own friends and acquaintances we could all think of children who we believe would be happier if they had only chosen different parents; but no one suggests that on that account they should be snatched from their homes, and adopted into another family. The law very properly provides that children cannot ordinarily be adopted without the consent of their natural parents. At the same time the courts do have the power to dispense with this consent, if the child has been neglected, abandoned, or persistently ill-treated, or if the parent or guardian cannot be found, or if his consent is 'unreasonably withheld', or if he has persistently failed without reasonable cause to discharge his obligations as a parent or guardian. This last provision was added only in 1958.

What constitutes unreasonable withholding the courts must decide for themselves as best they can. I recall a case in which a mother could never be found except when she was in prison, and then she always refused her consent. That case I suppose would now be covered by the provision about failure to discharge parental obligations. But it gave us a good deal of worry at the time. In another case a father who was divorced from his wife, and who had done practically nothing for his children, objected very strongly to their being jointly adopted by their mother and her new husband. This was on the grounds that they would lose the chance of inheriting a good deal of money. Whether this was really true or not was not easy to establish. But supposing it was true? Would it have been a good reason for refusing an adoption order?

The other side of the picture is the fact that the law, no doubt rightly, requires a higher standard from adopting than from natural parents. Natural parents in this country do not have to satisfy a court about their own health before they may have children; but in considering whether a proposed adoption is in a child's interest the court is required to have regard to the health of the applicant, and in certain cases a medical certificate may have to be produced. Here I am reminded of a case in which an apparently wholly admirable couple, in a good material position, applied to adopt a lovely baby who had been in their care for some months —nearly all its life in fact. But the woman turned out to be subject, though rarely, to epileptic fits. In the ordinary way epileptic women may have as many children as they can. But should this condition debar them from being considered as adoptive parents, when they cannot have any children of their own? One has to remember that if the Adoption Order is refused, a child will very likely still remain, just the same, with the same foster parents, and the only real difference if there is no legal adoption, is that the natural mother could, if she knew where the child was and she wanted to do so, take it back at any time. So it could be argued that the only effect of withholding the order would be to deprive the child of security and yet not relieve it of the physical risk inherent in being looked after by someone liable to occasional fits.

I have raised a number of questions, and I have deliberately given hardly any answers. I doubt if one can lay down any principle that will serve as a sure guide to the cases in which the courts are justified in depriving parents of their normal rights over their children, or in enforcing obligations which the parents

will not recognize. But I am absolutely sure that all the courts that I know are deeply conscious of their responsibilities in this matter; and the law, too, is generally fairly strict. Like most of the parents with whose children we magistrates are concerned, we do our best, and, like them, we doubtless also make our share of mistakes; but we certainly do not interfere for interfering's sake. We are only aware that in a civilized community parental power, just like any other power, cannot be allowed to be absolute.

—*Third Programme*

The Retreat from the Word

The second of two talks by GEORGE STEINER

IN my previous talk* I tried to show that language today—instead of being the vessel into which all reality is gathered, as it was until the eighteenth century—has a more limited sphere of relevance. It no longer applies to or organizes all modes of action, thought, and sensibility. Large areas of meaningful experience now belong to non-verbal languages such as mathematics, formulae, and logical symbolism. Others belong to 'anti-languages' such as the practices of non-objective art or atonal music. The world of the word has shrunk. And fewer words are in current use to fill it. The language of Shakespeare, by its force and its numeric immensity (the sheer number of words he uses), belongs to a stage in history in which words seemed in complete command of reality. Today's writer uses far fewer words because the kinds of reality of which words can give a necessary and sufficient reckoning have sharply diminished.

But language has not only suffered a diminution in the compass of its applications. As the western community has become less dependent on the central role of words to organize experience and conduct the business of the mind, the words themselves have lost some of their precision and vitality. This is, I know, a controversial notion. It assumes that language is organic in more than a metaphoric sense. It assumes that such concepts as tiredness or corruption apply to language itself and not only to men's use of it. Many people are no doubt disposed to deny this and I cannot here argue out what is a rather complex metaphysical controversy. Let me say only that I have De Maistre and Orwell on my side, and try to show what I mean.

With the immense diffusion of literacy to the lower classes as it took place in the nineteenth century, there came a corresponding decline in the standard of syntax and verbal usage. Surely there can be no doubt that the spreading out of language and its delivery into all hands has brought to it diminution and corruption. The English used by Mr. Eisenhower during a press conference, like that used to sell a new detergent, is intended neither to communicate truth nor to quicken the life of the mind. It is meant to evade, obfuscate, and dissolve the structure of meaning. It is only when there is in the places of power what Professor Blackmuir calls 'the new illiteracy' that a study of radio-active fall-out can be entitled 'Operation Sunshine'.

Restriction Without and Decay Within

One thing is clear: the instrument available to the modern writer is threatened by restriction from without and threatened by decay from within. In the world of the new illiteracy, the man to whom the highest possible literacy is of the essence, the writer, finds himself in a problematic situation.

I now come to the heart of my subject: the effect on literature of the great retreat from the word; not on all western literature nor even on a significant portion but only on certain literary movements or individual writers who seem exemplary of the larger withdrawal.

Conscious of the widening gap between psychological reality and the traditional means of verbal expression, a number of writers have tried, since the nineteenth century, to break out of the boundaries of language by transcending common syntax. Rimbaud, Lautréamont, Gertrude Stein, the surrealists, represent this impulse. They are all attempting to render language capable of expressing the life of the unconscious, of free association or of pre-verbal sensation. They realize that syntax, of itself, organizes our experiences into a temporal and consequent pattern. But the great plunge into the depths of personality which we associate with Blake, Dostoevsky, Nietzsche, and Freud, demonstrated that there were within man realms of energy and suffering too chaotic for traditional syntax. Instead of being that which is most common to a culture, the language of the modern poet becomes a private notation to which access is difficult for the common reader, if not impossible. In the hands of the masters, this veiling of language has indeed led to richening. With Rimbaud the word seems to pierce through the shell of the real to the more real. But in the hands of impostors, the venture of surrealism has turned to a gimmick. Realizing that a wider and largely unqualified audience was eager to play the game of poetic obscurity, that adroit juggler Dylan Thomas combined the disruption of syntax with the froth of romantic verbiage. He stood brilliantly for the proposition that one can have one's Orphic cake and eat it too.

Toward the Ideal of Musical Form

Another notable symptom of the distrust of language in modern literature is the turn toward the ideal of musical form. The thought of giving to words certain attributes of music is an ancient one. But from the time of French symbolism on, it assumes a specific intensity. Verlaine urged *de la musique avant toute chose*, meaning by that that a poem should communicate most immediately through its sonorities and aural rhythms. Among the symbolists, this cult of the tonal rather than the conceptual mode, led to a series of extraordinary poetic works which derive their full meaning only when they are actually set to music. Debussy and Richard Strauss, when they set to music Maeterlinck's *Pelléas* and Oscar Wilde's *Salome* were able to use the original intact. In both cases, the literary work is in fact a libretto in search of a composer.

In our time, this ideal of musical form has been carried even further. In both Romain Roland and Thomas Mann we find the idea that the musician is the artist in essence. Only music achieves the total fusion of form and content which all art strives for. It is to the extent that it approaches the condition of music that art becomes most wholly itself. In Hermann Broch's *Death of Virgil* and in Eliot's *Four Quartets* we find a notion which we can trace back to Mallarmé and the *Après-midi d'un faune*: the notion that a literary composition can suggest, through its formal arrangements, the corresponding organization of a musical form. *The Death of Virgil* is a novel built in four sections, each of which is meant to be the figure of one of the four movements of a classical quartet. The strands of meaning interweave; there are moments in which all the voices seem combined; there are dissonances and fugal passages in which repetition follows on repetition at set intervals. Indeed, the entire novel (which depicts the last twenty-four hours of the poet's life) is an attempt to transcend language toward more precise conveyances of meaning. In the last sentence the poet crosses into death, realizing that that which is entirely outside language is outside life.

I wonder whether one might not add a social footnote to this topic of the musical ideal in literature. In America, and to a lesser extent in western Europe, the new literacy is musical rather than verbal. The long-playing record and 'high-fidelity' have revolutionized the pursuits of leisure. Young people who have hardly read a serious book will listen with expert delight to Gregorian chants or Scarlatti sonatas. Where the library shelves used to stand there are now the record albums, row upon proud and esoteric row. Unquestionably, music is today the central fact

* Printed in THE LISTENER of July 14

of lay culture. It is easier to enjoy when one is tired than is serious literature. It stirs the emotions without perplexing the brain. It allows access to masterpieces even to those who have little previous training.

The Clipped Laconic Style

An important school of literature, in fact the dominant current school, has chosen to make a virtue of necessity. The style of Hemingway and of his myriad imitators, the tough, clipped laconic style, is a direct response to the diminution of linguistic possibility. One may admire this style or regard it as artificial and dull. But undeniably it is based on the narrowest possible conception of the resources of language. What its admirers fail to note is the distinction between using simple words to express complex ideas and feelings, as do Tacitus, the stylists of the Book of Common Prayer, or Swift, and using simple words to express simple, primitive, or fragmentary ideas and feelings. By narrowing language to the state of a verbal short-hand, Hemingway narrows the compass of observed and rendered life. He is often charged with a monotonous adherence to hunters, fishermen, prize-fighters or alcoholic soldiers. But this constancy is a necessary result of the available medium. How could Hemingway's language convey the mental and emotive life of more complex or articulate characters? Hemingway's repertoire of words just suffices to render the punk gangsters of *The Killers*. There are several reasons why the *Death of a Salesman* falls short of the apparent reach of Arthur Miller's talent. But an obvious one is the paucity of its language.

The brute, snobbish fact is that men who die with the words of Macbeth on their lips are more tragic than those who stutter platitudes in the style of Willie Loman. But language avenges itself on those who cripple it. A striking example occurs in O'Neill, a dramatist committed to the practice of bad writing. Scattered throughout *A Long Day's Journey into Night* there are passages from Swinburne. The lines are flamboyantly romantic and even decadent. They are meant to show up the adolescent inadequacies of those who recite them. But listen closely and you will see that exactly the contrary occurs. Swinburne's mastery of the word burns a bright hole into the surrounding texture. It lifts the entire action above its paltry level and instead of showing up the speaker, it shows up the playwright. Modern authors rarely quote their betters with impunity.

Let me, in closing, draw your attention to what we might term rearguard actions which certain writers are waging to cover or arrest the retreat from literacy. I shall take only a few examples and restrict myself entirely to English.

Counter-attack by Joyce

No doubt the greatest counter-attack on the shrinkage of language made by any modern writer has been that of Joyce. Since Shakespeare and Burton, literature has known no greater lover of words. And, as if aware of the fact that science had torn from language many of its outer provinces, Joyce chose to annex a new kingdom below ground, that of the half-conscious, and in *Finnegans Wake*, that of sleep. *Ulysses* did more than anything else since Milton to recall to the English ear the wide magnificence of its legacy. It marshals the great battalions of words, calling back to the ranks words long asleep or rusted, recruiting new ones by stress of imaginative need. Yet when we look back upon the battle, so magnificently won, we can attribute to it no positive consequences, no wider fruition. There have been no real successors to Joyce as there cannot be to a talent so exhaustive of its own potential. And, what counts more, the treasures which Joyce brought up from the mineshafts of language remain piled glitteringly about his own work. They have not passed into currency. They have caused none of that general quickening of the spirit of speech which discernibly follows on Spenser and Marlowe. I do not really know why. Perhaps the action was fought too late or perhaps the portion of failure and chaos in *Finnegans Wake* was too obtrusive. As it stands, the Joycean achievement is already a monument more than a living force.

Another rearguard action—or shall we say a long raid behind enemy lines?—is that of Faulkner. The means of Faulkner's style are essentially those of traditional rhetoric. Within a grammar which makes a constant assault on our feelings, he uses ornate, coruscated and violently contorted language, much of which derives from the Jacobean dramatists and the night-parlance of gothic fiction. Often his words grow cancerous, engendering further words in uncontrollable poison. Instead of concentrating sense, they dilute or obscure it into a kind of cloudy film. Often we hack our way to the meaning through the undergrowth of words instead of having it conveyed directly to us. Nevertheless, this baroque, idiosyncratic style is a style. Faulkner is not afraid of words even where he allows them to submerge him: and where he is their master his language has a tremendous thrust, carrying with it all the attendant powers of rhythm, cadence, and sensuous association. Much in Faulkner is over-written and even badly written. But it is always written. The act of fluency, which is the very definition of a writer, is not let go by default.

Wallace Stevens

The case of Wallace Stevens is particularly instructive. Here is a poet who was by nature an emphatic rhetorician, who saw language as a series of ceremonious and dramatic gestures, rather in the manner of seventeenth-century rhetoric. And he was a lover of the music and shimmer of words, passing them over his tongue like a taster of rare wine. But look more closely at some of these words: 'bright *nouveautées*', 'little *arrondissements*', 'foyer', '*funeste*', 'fictive', 'peristyle', '*peignoir*', 'port' (in the sense of posture, bearing). The point is obvious: nearly all are latinizations or naked borrowings from the French. They are inventions superimposed on language, not, as in Shakespeare or Joyce, new growths from within its natural soil. Where the intent is one of explicit exoticism as in the 'tambourines' and 'simpering Byzantines' of *Peter Quince*, the effect is valid and memorable. Elsewhere it is merely decorative or even chi-chi. And behind Stevens's linguistic acquisitiveness there is a persistent provincialism. He borrows French words as any American tourist might acquire French bonnets or perfumes, with a kind of obtrusive excitement. And only a provincial, in a manner peculiarly American, could have made the statement that English and French are closely related languages. Not only is the proposition nonsense, but it betokens a view of one's own medium which a poet should guard against.

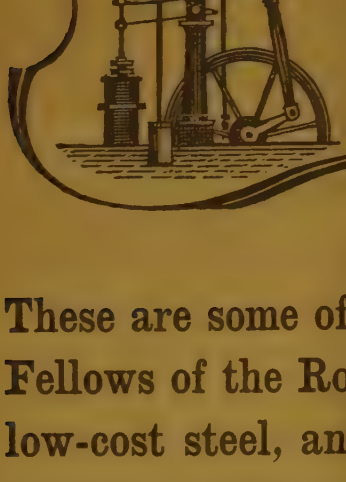
The best hope for a renaissance of the word seems to me to lie just now with a novelist. Let me quote something from his work:

> Suddenly at the end of the great couloir my vision is sharpened by a pale disjunctive shudder as a bar of buttercup-yellow thickening gradually to a ray falls slowly through the dark masses of cloud to the east. The ripple and flurry of the invisible colonies of birds around us increases. Slowly, painfully, like a half-open door the dawn is upon us, forcing back the darkness. A minute more and a stairway of soft kingcups slides smoothly down out of heaven to touch in our horizons, to give eye and mind an orientation in space which it has been lacking. Faraj yawns heavily and scratches himself. Now rose-madder and warm burnt gold. Clouds move to green and yellow. The lake has begun to shake off its sleep. I see the black silhouette of teal across my vision eastward. 'It is time'.

I know the objections to Lawrence Durrell. He cloys and sickens an ear trained on Hemingway. But it is the ear which is at fault, having been long impoverished. Durrell moreover is doing more than fighting a rearguard action. He is crossing the frontiers which language has allowed its enemies to draw around it. He is, in particular, seeking to absorb into the imaginative reality of speech the new world-image of relativity. He is, in short, trying to make language once again adequate to the manifold truths of the experienced world. His attempt entails excesses, and it is too early to know whether he has succeeded. But it must be made. Otherwise 'the next age may not be literate in any sense we understand or the last 3,000 years understood'.

—Third Programme

A new series of *Studies in French Literature* has been launched by Messrs. Edward Arnold under the general editorship of W. G. Moore, Fellow of St. John's College, Oxford. The first six essays are devoted to Racine's *Britannicus*, Molière's *Tartuffe*, Corneille's *Polyeucte*, the *Fables* of La Fontaine, *Candide* and *Les Fleurs du Mal*. There is a companion series on German literature, under the general editorship of Professor L. W. Forster and B. A. Rowley, of University College, London. The books cost 6s. or 6s. 6d. each.



The men who m

These are some of the great inventors—many of them Fellows of the Royal Society—who gave us abundant low-cost steel, and so opened the way to the modern age of scientific and technical progress.

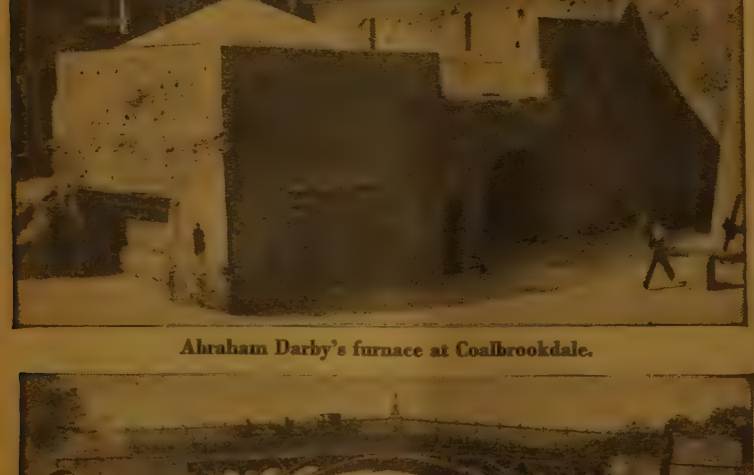
Benjamin Huntsman.

THREE hundred years ago, when the Royal Society was founded, there was no such metal as 'steel' as we know it today.

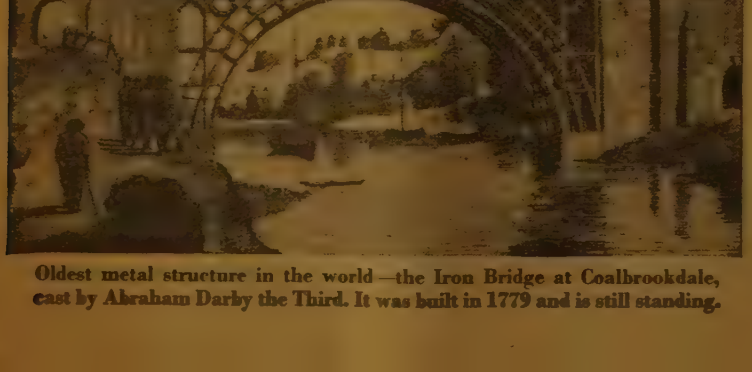
A crude form of re-carburised iron was available, known as 'blister steel', made by packing charcoal round bars of iron and heating for several days. But this was not of uniform texture throughout the piece – it might contain streaks of slag and soft iron. Nothing better in the way of steel was made until 1740. But before that, a significant discovery was made.

In 1709, Abraham Darby, a Quaker ironmaster of Coalbrookdale, Shropshire, succeeded in reducing iron ore to metal in a blast furnace using *coke* instead of the traditional oak charcoal, which was running out. So the coalfields of Britain filled the gap left by the oak woods.

This was an important technical break-through. Coke is both strong and porous, and does not choke the furnace. It made possible the quantity production of iron, and the immensely valuable later developments in steel-making on a large scale.



Abraham Darby's furnace at Coalbrookdale.



Oldest metal structure in the world—the Iron Bridge at Coalbrookdale, cast by Abraham Darby the Third. It was built in 1779 and is still standing.

Huntsman's earliest furnaces (from an old illustration).

Abraham Darby's furnace at Coalbrookdale is now being preserv for its historic interest. Abraham Darby the Third (grandson of t inventor) rebuilt the furnace in 1777 in order to cast the five ton ri for the Iron Bridge which still spans the Severn at Coalbrookdale a is the oldest metal structure in the world.

The first true steel was made by a clockmaker, Benjamin Huntsma He had become dissatisfied with his clock springs made from blist steel. He realised that they were unreliable because the carb content was not evenly distributed. He saw that if blister steel could raised to melting point in a crucible, a uniform product would resu In 1740 he made a crucible able to withstand temperatures arou 1,600°C, and produced the first " crucible steel ".

The steel firm founded by Benjamin Huntsman is still at work Sheffield after more than 200 years, making high grade tool steel by modern version of the crucible process.

The next great step forward came in 1856, when Sir Hen Bessemer, F.R.S., announced that he had succeeded in refining p iron by blowing air through the molten metal. The Bessem " converter " became, after some teething troubles, the first means producing steel in bulk – and producing it cheaply.

In 1865 Sir William Siemens, F.R.S., set up in Birmingham t first steel-making furnace using the regenerative principle, in whi hot gases from the furnace heat the incoming air and gas. This was t prototype of the modern " open-hearth " furnace – a type of ste

le the Steel age

Early Bessemer converter, now owned by the Science Museum, London.

making furnace which is even more important in this country and the U.S.A. than the Bessemer process. Today over 85% of British steel is made in open-hearth furnaces.

The advantage of this method is that it can use a proportion of scrap metal in the charge. By the late 1860's Britain was already heavily industrialised and plenty of scrap was available cheaply. The advent of the open-hearth furnace meant that this scrap could be turned to good use. The use of scrap is still important in British steel-making.

Another important advance was made in 1878 by Gilchrist Thomas, a clerk in a London Police Court who studied chemistry in his spare time. He discovered that a steel furnace or converter lined with calcined dolomite could refine phosphoric iron. Hitherto the plentiful phosphoric ores had been regarded as useless.

The steels then available were high carbon tool steels of the type made by the crucible process, and low carbon mild steels of the kind produced by Bessemer converter or open-hearth furnace.

Then Sir Robert A. Hadfield, Bt., F.R.S. discovered the remarkable possibilities of *alloy* steels. He had begun experiments in this direction before he was 21 – in 1879.

Other workers had discovered that manganese in steel made it

Sir Henry Bessemer, F.R.S.

Sir William Siemens, F.R.S.

Sir Robert Hadfield, F.R.S.

Dr. W. H. Hatfield, F.R.S.

harder, but also more brittle. At the age of 24 Hadfield found that the addition of *larger* quantities of manganese, 10% or more, produced a steel of a type never made before – a steel with remarkable qualities of toughness and ductility. Its toughness was increased when it was heated to 1,050°C and quenched in water – a treatment which makes carbon steel extremely brittle. It was also the first non-magnetic steel.

Manganese steel has another extremely useful characteristic: under impact it becomes harder on the surface while remaining ductile internally. Hadfield's alloy steels (he was also associated with the discovery of silicon steel for electrical purposes) were the forerunners of the modern alloy steels which have proved so useful to technology. Sir Robert was knighted in 1908 and elected F.R.S. in 1909, and received many honours throughout the world.

The discovery of stainless steel is always associated with the name of Harry Brearley. He was self-educated, and after working in the laboratory of Thos. Firth & Sons he became manager of the Brown-Firth research laboratories. Here, in 1913, he discovered that alloys of steel with a high percentage of chromium would resist corrosion – they were "stainless".

The development and the expansion in the use of stainless steel in Britain owe much to the scientific outlook and energy of another Fellow of the Royal Society, Dr. W. H. Hatfield, whose enthusiasm helped the production of stainless steel to become an important sector of the steel industry.

These men made the steel age. Their work made steel available in the quantities and qualities needed to apply other scientific discoveries to our everyday lives. Electric light and power; the internal combustion engine; the machinery that mass produces our cars and washing machines, plastics and textiles; nuclear power and jet aircraft – none of them would have been possible without a cheap, plentiful and highly versatile metal. Steel is the only material that meets all these demands.

Progress in steel-making has not reached its peak. New developments are still coming forward, not the least remarkable being the recent introduction of tonnage oxygen as a new raw material for making steel – in addition to the traditional raw materials, coke, limestone and iron ore. Oxygen by the ton is already giving higher outputs with less fuel. The days of great steel-making inventions are far from over.

The British Iron & Steel Federation

B.B.C. NEWS HEADLINES

July 13–19

Wednesday, July 13

Russia accuses Belgium of 'imperialistic intervention' in the Congo, and the United States, Britain, France, and West Germany of supporting her

The U.N. Security Council holds an emergency meeting about the Congo

The Labour Party decides not to alter clause 4 (on public ownership) of its Constitution

The Government is to set up a committee, under the chairmanship of Sir Harry Pilkington, to inquire into the future of sound and television broadcasting

Thursday, July 14

The central Congolese Government breaks off diplomatic relations with Belgium

Unofficial strike of seamen spreads to six more northern ports: hundreds of holiday-makers stranded in Northern Ireland

Britain's 'trade gap' in June increases to £99,000,000, the biggest for three-and-a-half years

Friday, July 15

The first United Nations troops arrive in Leopoldville, Congo

Russia rejects the United States' protest over the shooting down of an American reconnaissance aircraft in the Arctic

Saturday, July 16

The Prime Minister of Katanga announces that the two neighbouring provinces of Kasai and Kivu and the Belgian trust territory of Ruanda Urundi are seeking federation with his newly declared independent province

Ships of the Royal Navy take emergency supplies to some of the Western Isles cut off by the seamen's strike

Sunday, July 17

The Congolese Foreign Minister and three other Ministers resign

The Secretary-General of the United Nations invites three European countries, an Asian and a Latin-American country to send troops to the Congo

Monday, July 18

Prime Minister of the Congo threatens to call in Russian military help unless Belgian forces withdraw by tomorrow

The pilot of the American U-2 aircraft is to be put on trial in Moscow next month

Tuesday, July 19

Mr. Macmillan tells Mr. Khrushchev in a personal letter that patience and restraint seem to have been absent from recent manifestations of Soviet Government policy

Belgium agrees to withdraw her troops from the Leopoldville area of the Congo by July 23

The Queen formally opens the celebrations marking the three-hundredth birthday of the Royal Society

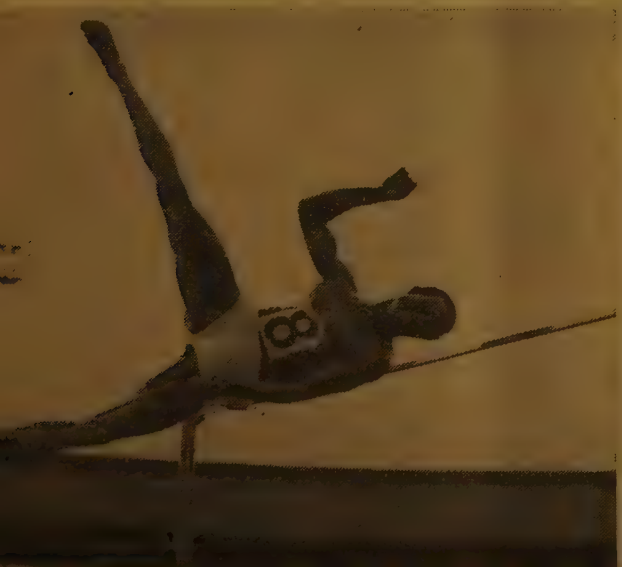
The King and Queen of Thailand begin a two-day State visit to Britain

The scene in the Los Angeles Coliseum during the Democratic Party's Convention on July 13 to choose its candidate for the Presidency: supporters of Senator John Kennedy parading in the arena after he had been nominated by Governor Orville Freeman of Minnesota. Senator Kennedy polled 806 of the 1,521 votes cast (see page 96)

A drawing of the proposed new shopping centre for the Elephant and Castle, in south London, which has been accepted by the town planning committee of the London County Council. The centre (designed by Messrs. Boisevain and Osmond) is planned on three levels and includes an arcade with a glass roof that can slide back in fine weather

ler (centre), British Chief of Staff of the Ghana Army, talking right) and Mr. John Elliott, Ghana's Ambassador to the Soviet nerican Embassy in Leopoldville after he had arrived in the the first detachment of United Nations troops on July 14

laining the workings of the control desk to a group of young y' at the television transmitter at Crystal Palace, south London, on July 16



A Belgian paratroop officer checking the identity of a Congolese near Leopoldville airport after it had been occupied by Belgian troops last week

A photograph taken from the top of the Arc de Triomphe of the traditional parade held in Paris to celebrate Bastille Day on July 14

Left: R. E. Kotei of Ghana clearing six feet ten inches to create a championship record in the high jump during the Amateur Athletic Association's annual meeting at the White City stadium last Saturday

The Lion and the Lamb

By LEONARD CLARK

THE lion belonged to Bostock and Wombwell's menagerie. I never saw him myself but he was said to be a very fearsome beast. It all happened a long ne before I was born, but I grew up with the ry of his escape on a snowy night in autumn the eighteen-nineties.

Of course, I knew the menagerie well; Bostock d Wombwell's was one of my childhood joys. ne famous travelling show of wild beasts often sited my part of the world in the West untry. How I waited in breathless expectancy r the arrival of the strange and exotic beasts om 'the steaming forests of darkest Africa, e mysterious rivers of South America, the nse jungles of Asia, and the unconquered seas ound the Poles'. They were, it seems, to be ought to my very door, almost overnight. I s, in fact, so impressed by what those bills d to say that I used to open our front door utiously before bedtime and look out into the ght to see if any wild animals were roving ere. But there was never a one. There was thing more exciting than Archimedes, our niliar and peaceful cat. And when the cages mbled into the town and the menagerie had ablished itself for the best part of the week the railway meadow, school couldn't hold me.

angerous Corner

But to return to the lion. There was a ngerous corner not far from our house where e road, winding up from the village of Little- an in the valley, took a sharp right-angled rn before it made the final climb to the top of e hill. Quite apart from the steep gradient d camber it was a desolate spot. Whenever e passed, Mother used to say in an awed and shed voice: 'That is where the lion got out', d then she tightened her grip on my hand d hurried me off down the hill.

Bit by bit I got the story out of her. And as grew up I talked to a few of the old people o told me more. It all seems so innocent and using now, but it was a sensation at the time. seems that Bostock and Wombwell's wild- st show was billed to arrive during the last ek of October. Just after it had left the main d to strike into the Forest of Dean, it started snow, the first flakes of what turned out to a hard and bitter winter. And it went on owing. A wind got up and drifts began to e. The wagons made slow progress up hills t got steeper and steeper. But they pressed mly on, hoping to reach the showground ore evening. Still the snow fell and swirled; tober had never known such a storm. The owmen walked by the side of the swaying avans, or held the horses' heads for, by now, e road had become a sheet of glass. It was not til just after six o'clock that the procession ched Littledean.

It was dark now and there were still three or r miles to go, and all uphill. Those who had de the journey before knew that the worst was yet to come. But with torches burning, the caged animals restless and angry from their jolting ride, the foam-flecked horses straining at the painted wagons, they started on the last lap. Then at the lonely spot I have described it suddenly happened: a horse slipped to its knees, took another with it, a wagon lost balance, slithered into the bank, and then crashed over on to its side—and this wagon was the cage of what the bills described as 'the fiercest lion in captivity'.

Conqueror's Escape

The accident threw everybody into confusion. Sweating men shouted and rushed here and there in desperation. The animals bellowed and snarled. The homely English air quivered with the unearthly cries of Africa, Asia, and America. Flame flickered on falling and fallen snow; people in houses, half a mile away, about to sit down to an early supper, wondered what all the commotion was about. But Conqueror, 'the fiercest lion in captivity', had leapt out through the shattered bars of his cage and was away into the night with half the menagerie's hands in pursuit. Some remember seeing them running across the snowy fields with torches held high, others how the wagons eventually limped into the town to report at the police station the escape of a lion. But though the inspector, sergeant, and both constables turned out immediately with a dozen other of the natives to scour the countryside with shotgun, pitchfork, and walking stick until midnight, Conqueror remained at large.

Morning broke fair and white. By a superhuman feat of nocturnal engineering the menagerie had pulled itself together, and the cages, not yet all unbarred, were ranged in a long oval the whole length of the snow-covered railway meadow. The show was going to open as usual to the public at three o'clock that afternoon. But one cage was missing: and Conqueror was the great attraction.

Rumour Gets Busy

The first news of the lion came from our milkman, William Godbeer. Mother told me he took her aside at 7.30 a.m. to say: 'You've heard about the lion, 'aven't you? Well, I've seen his tracks. Saw 'em in Long's Meadow when I was coming to work this morning'.

Shortly after breakfast mother's neighbour, Mrs. Whittle, rushed in to say that Mrs. Cox had just heard from Mrs. James next door that six lions had got out of Bostock and Wombwell's and had already eaten a whole sheep on Pope's Hill. Later it turned out that it wasn't a sheep but a baby; Williams the coalman had seen the bloodstained shawl. But happily this was contradicted before noon.

'People shouldn't say such things', said Mrs. Whittle. A dozen rumours flew round the town that morning. According to well-authenticated reports, the lion had been seen at Newnham, Drybrook, Ruardean, and Coleford, places miles apart from each other. If some people were to be believed, Conqueror had been seen in all four places at once. A miner returning home from work at Lightmoor Colliery declared that he had seen the beast chasing chickens. A woman at Collafield watched him disappearing into the forest. Matters reached some kind of climax when Sam Jenkins, the town crier, paraded the streets to announce that 'Bostock and Wombwell's, now appearing on the railway meadow, offer a reward of five pounds to anyone giving information leading to the capture of a lion which had escaped the night before and which answered to the name of Conqueror'. ('If you can get near him', muttered Sam under his breath.)

There was quite a scene that afternoon at the weekly meeting of the Women's Bible Class in the old schoolroom. Miss Rolls, a mild and gentle lady of the lean and angular type, was charitable enough to suggest that the poor beast might starve to death in such weather, and might it not be a Christian act to leave out some food for him? Whereupon Mrs. Lewis crushed her with the remark: 'I never heard such a thing. And why not put yourself out? Not that he'd get much off *your* bones'.

'All a Bit of Advertisement'

The menagerie had full houses at both showings. So much so that the elder Miss Boud at the sweet shop puffed up and declared that it was all a bit of advertisement and that no lion had ever escaped at all.

So ended the first day of Conqueror's freedom. That night the children were sent to bed early. But the local pubs were overflowing and every one had its own bit of local gossip about the lion. A pair of lovers were prepared to swear on oath that they had felt the lion's hot breath on their necks when they were quietly sitting on the hay in Marsh's loft. George Johnson, ex-private of the Gloucesters, who had spent two days in West Africa en route to the Cape of Good Hope in a troopship, became quite an authority on lions, because he boasted that he had seen them in the jungle and knew all their habits, and how to catch them. 'The liar', said Frank Bishop, ex-private of the Herefords.

It was on the second day that 'Silly' Ted, who was a bit soft in the head and wasn't allowed to wander very far from his home, strolled into the police station to say: 'About that lion what got out. I've seen 'im. I was just a-going to do a herrand when there he was a-walking down our path. I said to 'im, "What be you a-doing 'ere," He looked at me and said, "Hallo, Teddy. I got out. I can go where I like." I said to him, "You go back home, Bostock." And he never said another word but just went off down the lane'.

The sergeant was not prepared to accept Ted's evidence. He snorted and told poor old Ted to 'op it. And in any case, what mattered most

was not who had seen Conqueror, or where, but how soon Conqueror was going to be captured.

Then word got out that the military were to be sent for from Gloucester. Before evening, so it was said, the soldiers were on their way, marching through the snow in close order, drums beating, standards flying. Then, later, they were bringing a field gun with them. By nightfall, Evan Evans—who worked for the Council—had heard that they couldn't get the gun up Littledean Hill because of the state of the roads, but they were marching on without it. Needless to say, no soldier ever turned up that night or any other.

But Harry Smedley, the builder, who could always be found in the White Hart at any hour of the day or night, turned over a new leaf and became a reformed character. Apparently, he had been working out of the district for a few days and had not heard about Conqueror's escape. On the way home he dropped into the pub for a drink. There was hardly anybody there at the time and everything was nice and quiet. Charlie Dent and Les Griffiths were sitting on each side of the fire. Alec Cowmeadow, the landlord, was polishing glasses. After a while, Harry slipped out to go round the back. When he came in again his face was far whiter than the snow and he was trembling all over like a jelly. He slumped down on one of the chairs and pushed away his half-drunk mug of cider. Then he startled the company by gasping out: 'I be never a-going to touch another drop of that stuff. I finished with it'.

'What's wrong with it, 'Arry?' said Alec.

Harry lifted his arm up and then let it drop. 'I just seen a lion out there, a girt big lion, with slobbering chops and shining eyes'.

Charlie and Les stood up. 'Eh', they both said together, 'Harry's been and seen Conqueror'. They rushed out to the back, too, but the lion had gone. But nobody could ever convince Harry that the lion he had seen was a real one. And he was never seen in a pub again.

The menagerie was still doing well. The lion was still news. 'Poor thing', wailed Miss Rolls, 'he'll have died from exposure'.

'They've got him all right, but they won't let on', said the older Miss Boud. And then quite quietly, on the afternoon of the third day Conqueror was captured. 'Captured' is hardly the word. 'Discovered' is nearer the mark. He was discovered by his keeper in the Vicar of Littledean's parlour, lying down and enjoying himself before the fire. The Vicar, who had once been a missionary in Persia, said that the animal had just trotted in that morning. 'He wasn't a bit fierce. He didn't growl at me. So I gave him my dinner, a leg of pork, and then sent a message to the police station. When he'd finished eating the leg of pork, I gave him another, for I'd just killed a pig. Then he lay down where you see him now. I've been reading the Bible to him'.

The Vicar's name was the Reverend Lamb. And when they came to take Conqueror away they had no bother to get him into his new cage. The Vicar tickled his ear, as a matter of fact. Then the joke of it suddenly struck all of them. For they'd seen the lion lying down with the lamb.

Nobody will ever know where Conqueror had been for two and a half days, or how he had kept himself alive. The elder Miss Boud said he had been in the vicarage all the time. When the menagerie moved on, the town settled down once more to its country ways. But Conqueror was never forgotten. When Bostock and Wombwell's came a few years later they had a new lion, 'the fiercest lion in captivity'. And Littledean had a new vicar. For Mr. Lamb was walking in heavenly pastures with, is it too much to hope, the lion?—*Home Service*

Letters to the Editor

'The Private Papers of Hore-Belisha'

Sir,—Captain Liddell Hart's comments (THE LISTENER, July 7) on my review of Mr. Minney's *The Private Papers of Hore-Belisha* are full of interest and I do not wish to dispute many of his corrections and amendments. I am sorry if I gave insufficient credit to the reformist aspirations in the army between the wars. My main point, with which Captain Liddell Hart does not really disagree, is that the political and military climate at the top made it more difficult for Hore-Belisha to realize those aspirations than it had been for Cardwell and Haldane in their day.

Nevertheless, when all allowances are made, I am still convinced that Hore-Belisha missed an opportunity when he substituted Gort for Deverell as C.I.G.S. after his purge of the Army Council at the end of 1937. It is generally agreed now that Gort's undoubted talents lay in the direction of command in the field rather than the staff. Perhaps the alternative names that I suggested were too junior not to have created resentment among those passed over. But it is slightly misleading to contrast Alan Brooke's position 'less than half way up the major-generals' list' with Gort 'filling a lieutenant-general's post' unless one adds that Gort had been a major-general himself until barely two months earlier when he received local rank as lieutenant-general on being promoted, thanks to Hore-Belisha's personal intervention, to the post of Military Secretary, and that he was three years younger than Brooke. However, I would no doubt have done better to have instanced Dill and Wavell who were cleverer and surely no less progressively minded than Gort. Dill, moreover, was considerably senior. I suspect that one of Hore-Belisha's defects was that he was not always a good judge of men. The appointment of Ironside as C.I.G.S. in 1939 seems to be a further piece of evidence on this point.

Captain Liddell Hart considers that I am 'off course' in my suggestion about the reasons which caused his own association with Hore-Belisha to damage the latter in some military circles. This is a delicate matter though not one of major importance. I never implied that it was a principal factor in bringing Hore-Belisha down, and therefore did not elaborate upon it. I am sure that Captain Liddell Hart is right in referring to his advocacy of the tank arm as an element in the hostility felt for him. I am also sure that it was not the only one. I mentioned his friendship with Lloyd George. My own view, which is not based on mere surmise, is that his alleged part in advising Lloyd George over the military part of the latter's war memoirs created far more resentment in the stuffier army circles than anything which he himself wrote. This was the point of my contrast with Duff Cooper. I was, of course, aware that he too consulted Captain Liddell Hart, but I thought that Captain Liddell Hart played a far bigger role—and certainly a more conspicuous one—as adviser to Hore-Belisha than he ever did as adviser to Duff Cooper. It is perhaps not wholly irrelevant to note that Captain Liddell Hart's name is not even mentioned in Duff Cooper's autobiography. One can hardly imagine a similar lacuna, had Hore-Belisha lived to write his. Let me conclude this particular topic by adding that I am sure that such prejudice as was felt against Hore-Belisha on account of Captain Liddell Hart was unfair and unjustified.

Finally, there is the comparison between Cardwell, Haldane, and Hore-Belisha. Setting aside the comparative difficulties under which they laboured, I am not wholly convinced by Captain Liddell Hart's criticism of the common view of their comparative achievements. Surely Cardwell's army was fully capable of coping with the colonial and frontier wars which formed its principal task in the decade which followed. True, it put up a poor performance in the early stages of the Boer War, but this took place a quarter of a century after Cardwell's retirement. His successors must bear much of the blame, in particular Campbell-Bannerman who, having managed what Cardwell was never in a position to effect, *viz*, the removal of the Duke of Cambridge from the post of Commander-in-Chief, failed to implement the recommendations of the Hartington Commission, abolish the post, and create a general staff. Had this chance been taken, many of the worst blunders in the Boer War would probably have been avoided.

As for Haldane's B.E.F., even if some historians have overstated its virtues, the general

erdict that it saved the left wing of the French rmy from being enveloped, thus preventing the ll of the Channel ports cannot easily be set ide. Certainly the B.E.F. in 1940 was lamentbly let down by the French, but was it a better rmy than its predecessor? Captain Liddell Hart onsiders that it was 'professionally superior many respects'. Military opinions notoriously iffer. At least one other expert takes the pposite view. 'In September 1939', writes ield Marshal Viscount Montgomery of lamein, 'the British Army was totally unfit to ght a first-class war on the continent of urope'.—Yours, etc.,

Christ Church ROBERT BLAKE

The Retreat from the Word

Sir,—Surely Wittgenstein was wrong, as is Mr. George Steiner who quotes him (THE LISTENER, July 14), when he declares that what annot be said clearly must not be said at all; here clarity is equated with accurate definition, nd reaches its acme in mathematics?

There are many statements which cannot be efined with any degree of accuracy, judging this y mathematical standards; but which retain a naximum of significance, nevertheless, from a uman stand point. 'I am: happy; healthy; in ove; a philosopher'. All these would be impossible to define clearly: but they convey nough to warrant verbalizing, and would be ifficult to convey in silence.

Again, the second quotation is surely aiming or an inhuman ideal? It is incorrect to say that thics cannot be expressed: how else does one eneration learn its behaviour from the preceding one? What is manifest is that ethics cannot e expressed *clearly*, using this term in the sense sed above, but that is not sufficient excuse for rresponsibly retreating from a study of ethics.

If one sets one's standards of accuracy as near o mathematical absolutes as this, it is not surprising that many of man's activities are regarded y such investigations with silence; and certainly not with assistance. The significant features of personality are not its accuracy in conforming, passively, to any mathematical concept that may be invented. It is by demanding this kind of inhuman standard that investigators exclude from the scope of their study the most vital parts of man.—Yours, etc.,

York ROBERT JOHNSON

Sir,—In his examination of 'The Retreat from the Word' (THE LISTENER, July 14) Mr. George Steiner says: 'And it is in becoming ever more like a mathematical science that Comte saw for the humanities the only future in a positive age'. He saw nothing of the kind. This is one of three persistent misconceptions about Comte's view of a science of society, the other two being that he wished to reduce it to a biological or a physical science.

Anyone acquainted at first hand with his work knows that he went out of his way to point out the limitations to the use of mathematics in the study of social phenomena. He even went so far as to state: '*Du reste, toute idée de nombre effectif et de loi mathématique étant déjà directement interdite en biologie, comme je l'ai suffisamment expliqué, elle doit être, à plus forte raison, radicalement exclue des spéculations encore plus compliquées de la sociologie*'. (*Cours de Philosophie Positive*, Vol. 4, *5e édition, identique à la première* [*i.e.* 1839], Paris, 1893, page 410). Mr. Steiner's own strictures, in the next paragraph, on what is in effect only one particular segment of American sociology, are suggested, in a more *nuancé* manner, in this warning by Comte himself: '*L'analyse mathématique elle-même, aujourd'hui si justement préconisée, peut néanmoins exposer, par exemple, à l'inconvénient essentiel, trop souvent réalisé, de prendre des signes pour des idées: on ne saurait nier que, surtout de nos jours, elle ne serve quelquefois à déguiser, sous un imposant verbiage, l'inanité des conceptions*'. (*Id., page* 370).—Yours, etc.,

Leicester I. NEUSTADT

Milton's Satan

Sir,—Professor Empson is mistaken when he says (THE LISTENER, July 7) I have argued that Milton's Satan 'must be meant to be funny'. I took *Paradise Lost* as a tragic, and *The Egoist* as a comic, treatment of 'the satanic predicament'. I said that Milton has subordinated the absurdity of Satan to his misery; but that, just as Meredith cannot exclude all pathos from Sir Willoughby, so Milton cannot exclude all that is ridiculous from Satan. Surely the distinction between saying this and saying that Satan is 'meant to be funny' is not imperceptibly fine?

Yours, etc.,

Cambridge C. S. LEWIS

Southend-on-Sea

Sir,—I have received a number of complaints, from both visitors and residents, as to the unsavoury reference to Southend-on-Sea in Miss Joanna Richardson's article (THE LISTENER, July 14), to the effect that if she had been asked to name the least romantic place she might well have plumped for that horror of horrors, Southend.

A typical comment from an enraged visitor is: 'I am struck with horror to know that a responsible paper should allow comments of this kind to appear, and would have credited the B.B.C. with better taste', a sentiment with which I feel bound to admit I agree, the more so as Southend's relations with the B.B.C. have always been of a most cordial character and they are generally most fair to us.

I can only assume that Miss Joanna Richardson has either never visited Southend or has not taken the trouble to look around her when she was here, as this seaside resort has a great deal of natural beauty to offer, and can compare in this respect with most other seaside towns in the country.—Yours, etc.,

Southend-on-Sea L. A. W. JONES
Publicity Officer

[*Miss Richardson is an independent critic.*—EDITOR, THE LISTENER]

How We Broadcast from Leopoldville

By LIONEL FLEMING, B.B.C. Commonwealth and Colonial correspondent

COMMUNICATIONS are practically cut at Leopoldville, and the radio station has almost closed down. So one goes across to Brazzaville, on the French Congo side, and broadcasts from there. It is a nice change, anyway, from an increasingly simple diet—one can eat well in Brazzaville—and, in any case, the journey is pleasant and even impressive, for the Congo is three miles wide. So one takes the ferry, and comes back in the early afternoon to pick up the rest of the news from Leopoldville.

The first day was fine: everything went according to plan. The second day I arrived at the ferry to find the Congolese troops there in force, waving their guns and shouting. A lot of Africans were getting on board, however, and I did not see why I shouldn't go too. But when people begin to shout rapidly in French, I begin to lose the thread a bit, and all I could gather from the Force Publique was that neither I nor any other European was to go. I got on board at last by shouting back: 'Foreign journalist—I will return', and I pushed my way past the unfortunate waiting refugees on to a boat entirely filled by Africans, except for a colleague who had managed to get on with me. The boat moved off. It stopped just off shore and dropped anchor. We stayed there for an hour, getting very hot. No sign of movement; we are now properly in the cart. But, at last, the crazy providence that looks after the Congo relents, and we get away.

Having broadcast our stories from Brazzaville, we returned to the ferry, to find that all services had now been cut off. Our outward boat was, in fact, the last to cross. Solution? Sleep on the floor of the American Consulate, and catch the first boat back next day, if there is one. In fact, we did better than that: they gave us beds at the Consulate. Back to Leopoldville then, next morning, to catch up on the news, and out again to Brazzaville in the early afternoon to broadcast. At the Leopoldville end there is now a strike. This may be the last boat to go. Never mind, take a chance. The boat is just casting off. Loud shouts from officials: 'Where is your ticket?' That can't be helped: all that is needed is a quick run and a fairly easy jump on board.

Back to Leopoldville in the evening, but we find that our outward boat was again the last boat to cross. Answer: a private launch is just about to take off. Several other people have the same idea. But not so the harbour master. Impassioned speech from him which I cannot follow, but which seems to be to the effect that he is trying to save our lives by preventing the journey. It turns out that he feels the pilot is not properly qualified. We may be swept away by the rapids below Leopoldville. The argument is obviously absurd—there are far worse prospects in Leopoldville than rapids. So back home again.

At this point you may ask how this report was broadcast in London. That is simple: I recorded it in Leopoldville on my little tape recorder, and I gave it to a friend to take over to Brazzaville and transmit from there. I intend to have a day off. Let him do the running and jumping for a change!

—'*From Our Own Correspondent*' (*Home Service*)

Round the London Art Galleries

By ALAN CLUTTON-BROCK

IT needs a large and retrospective exhibition such as is now being held at the Whitechapel Art Gallery to give an adequate impression of Ceri Richards's art and habit of mind. At first sight the effect may be bewildering, and may even make one wonder whether an artist who has tried so many styles and techniques and borrowed so many idioms from other people's pictures can be taken altogether seriously. It is obvious that he has many gifts: his use of colour is seductive and full of invention, he has a naturally graceful touch which shows itself as much when he builds up a rough impasto as when he paints with light and transparent washes, and he is fluent in spinning out a great variety of designs. But these gifts, it might be thought, have sometimes enabled him to dance lightly over difficulties, to take refuge in decorative charm, and, in short, to adapt rather than to invent. Thus even devices akin to those of the action painters and abstract expressionists are used by him in his latest pictures with a lightness and charm that one would hardly have thought compatible with what is usually so harsh and provocative a method of painting.

The answer seems to be that the restless, rapid, and inquiring turn of mind which has led him hither and thither along the highways and byways of twentieth-century art goes quite naturally with an adventurous and often poetic imagination. As soon as it receives some stimulus from the visual world, or even from music and poetry, Richards's pictorial imagination begins working swiftly but also with great persistence. He may have painted in many styles but by contrast his themes have been few, worked over many times or taken up again after an interval devoted to some other idea.

Among his later works, for example, there is a long series of paintings, done over a period of three years or more, entitled 'La Cathédrale Engloutie'. Debussy's music and the visual images which it and the words of the title may call to mind have obviously haunted him and prompted a great variety of pictorial inventions, forms and schemes of colour which are all directly related to this intensely romantic idea of a ruin beneath the sea.

In early versions of the subject Richards worked the keyboard of a piano into the design, a fantastic juxtaposition which seems to have come about for the rather insufficient reason that in an earlier series of paintings of interiors of music rooms the keyboard was always a prominent feature of the design. Before long this object disappeared and the paintings now showed fragments of Gothic architecture shadowy and evanescent beneath the waves. In the latest versions which come near to abstractions the main feature of the design is a number of dark circles representing, though one could hardly realize this without being told, the bases of ruined pillars. Such fantasy-making might be thought over-deliberate and contrived, but in fact the imagery, even when it can hardly be interpreted without a key, is always charged with romantic overtones; because the artist has felt so strongly and brooded so persistently about his subject, both the colour and the forms, however obscure may be the references they make, are strangely evocative and romantic in effect.

This faculty for sustaining a mood throughout a long series of pictures, sometimes a mood that is altogether different from that of a preceding series, seems to be the most remarkable and individual of Richards's gifts, and it surely explains and excuses his eclectic use of a variety of styles. For scenes of violence, such as the series of paintings of the rape of the Sabines and various other paintings, he requires an entirely different artistic idiom from that which he uses in scenes of gaiety like the paintings of Trafalgar Square, with fountains, pigeons and paving stones transformed by a dazzle of light. But Richards is also, of course, a virtuoso who enjoys the exercise of skill for its own sake. This appears very clearly in his constructions or *collages* of wood, metal, paper and various oddments which are as neat and amusing as any conjuring trick, or again in his perfectly realistic and delicately finished portrait drawings.

'The Rape of the Sabines', one of three pictures on this theme by Ceri Richards: from the retrospective exhibition of his work at the Whitechapel Art Gallery

At Kenwood until October 2 there is a comprehensive exhibition of the extremely varied work of Francis Hayman, whom Horace Walpole called 'a strong mannerist, and easily distinguishable by the large noses and shambling legs of his figures'. He is certainly one of those artists who succeed in being very influential without being very good; it is almost certain that the young Gainsborough learned much from his work and he introduced a variety of subjects, or methods of treating subjects, which were new to English painting. He could and would turn out anything, from the stilted history painting which he presented to the Foundling Hospital, to the charming and elegant pastoral, the 'Dance of the Milkmaids on May Day', from ceilings to conversation pieces, and from portraits to book illustrations. At Vauxhall he was given a free hand and produced eighteen large paintings to decorate the supper boxes, scenes from Shakespeare and from contemporary novels, a picture of a cricket match, and scenes of rustic gaiety.

Hayman learned much both from Hogarth and from Gravelot and other French artists who introduced the rococo manner to England. Only occasionally was he able to fuse with complete success the earthy realism of the English temperament with French elegance, and the somewhat incongruous mixture of the two is what gives his conversation pieces their curious and amusing quality. There is the Jacob family, for example, not very important country people who have put on their best clothes and tried to pose in elegant attitudes in front of a pretty landscape while their likeness is taken. It is all rather absurd, but there they are, fixed for the information of posterity with an accuracy that some more capable and sophisticated artist might not have been able to achieve.

Milton's God

'Heaven's Awful Monarch'

The last of three talks on 'Paradise Lost' by WILLIAM EMPSON

IN the earlier talks* I have been arguing that Milton made out a strong case for the falls of Satan, Eve, and Adam. This is really the Victorian point of view. Milton believed they were all three in the wrong, but he was accustomed to adjudicate high and subtle points of conscience in a Puritan manner, and he made the story noble or sublime by giving all of them such impressive motives that a good judge might almost doubt whether they were in the right. Milton would think we had better not be ashamed of our first parents, nor yet of the angel who made them fall; also, we had much better be warned that God is liable to catch us out very queerly. Yes: but how could Milton reconcile it with justifying the ways of God, which he begins the poem by saying he will do? So I need to end this series by considering what goes on in Milton's Heaven.

Making God Look Unfair

To start with, the more Milton gave dignified reasons for the three falls, the more he made God look unfair. And he even seems to arrange to make us realize how Satan felt about God. For example, Satan says at the start of the poem that he cannot now pretend to revere a God who so late doubted his empire. The reader is sure that Satan is mistaken; but then, when we get to the war in Heaven, God actually does doubt his empire:

> Let us advise, and to this hazard draw
> With speed what force is left, and all employ
> In our defence, lest unawares we lose
> This our high place, our sanctuary, our hill.

Many pious readers must have thought Milton was going wrong about theology there, but the Christ at once points out that this is one of God's jokes; God is merely delaying the victory so as to prove the unique powers of the Christ. We can accept this as a natural enough joke from Omnipotence, but it does not feel like the joke of a transcendental God mysteriously identical with goodness itself. When we begin the poem and find Satan claiming equality with God, believing that God has not really the unique metaphysical position that he claims, we feel sure Satan is meant to be wrong; but when we meet God, later in the poem, and find him so very unmetaphysical, we are tempted to feel 'This can't be God'. But to feel that is already to join Satan's party; that is his basic claim. Satan was meant to be frightening, not to be a figure of fun, and you may feel here 'Satan is so subtle that he is liable to corrupt you even while you read about him'. This is not bad poetry; it is *why* Satan feels so frightening.

But also, everything in Heaven has an authoritarian character, just what you would expect if God was usurper, as Satan believes him to be. The poets have not usually thought of Heaven as full of angels with titles ordering other angels about, but as like being at the seaside; it is that immortal sea where the children sport upon the shore. After Raphael has described the creation, he encourages Adam to describe how he woke up in Paradise, and explains he was not there that day, he was sent towards the Gates of Hell, squared in full legion,

> To see that none thence issued forth a spy
> Or enemy, while God was at his work,
> Lest he incensed at such eruption bold
> Destruction with creation might have mixed.
> Not that they durst without his leave attempt
> But us he sends upon his high behests
> For state, as sovran king, and to inure
> Our prompt obedience.

Army of Low Morale

Raphael was the angel most interested to see Adam created, of the angels we hear of, but God sent him away, and Raphael cannot imagine that Satan would dare come out unless God told him to, so he assumes this was only for discipline. The morale of this army must be very low. They know that God made them fight half their number for three days, knowing they would lose, and only wanting to prove to them that they were useless. When God chose to let Satan out, God simply ordered his own troops out of the way. When the angels capture Satan in Paradise Satan is cheered up at the prospect of fighting them again:

> to try once more
> What thou and thy gay legions dare against;
> Whose easier business were to serve their lord
> High up in Heaven, with songs to hymn his throne
> And practised distances to cringe, not fight.

It is hard not to feel Milton himself snort here. The warrior Gabriel answers:

> Who more than thou
> Once fawned, and cringed, and servilely adored
> Heaven's awful monarch?

This is believable, but also it is catty; it proves that Heaven was already a most unpleasant place before Satan fell. Then God orders his troops to release Satan, so that he may continue to tempt mankind; the angelic guard fails only because it is betrayed by its own commander.

At the beginning of the poem Milton tells us that God released Satan from his chains, for the trial of man; but God himself, when he first speaks in the poem, says that Satan has broken out and got beyond control. God here is watching Satan arrive at the newly created universe, and announces to the assembled angels that Satan will certainly produce the fall of man. The scene goes on to the offer of sacrifice by the Christ, and is full of startling changes of tone. God says in his first words:

> Only begotten Son, seest thou what rage
> Transports our adversary, whom no bounds
> Prescribed, no bars of hell, nor all the chains
> Heaped on him there, nor yet the main abyss
> Wide interrupt can hold; so bent he seems
> On desperate revenge, that shall rebound
> Upon his own rebellious head.

This is merely the first of God's appalling jokes. There is no opportunity to say so, as there is after the joke about the war in Heaven, because God's curse against Adam for the fall he has not yet committed goes steadily on. Milton would have justified himself by a verse of the second Psalm: 'He that sitteth in the Heavens shall laugh; the Lord shall have them in derision'. But it makes Satan feel magnificent rather than absurd. It cannot be a mistake by Milton, because he is writing so extremely well; 'wide interrupt can hold' comes out like the cry of sea birds on rocks; it has what I think is meant by the term plangency. It must have meant something important to him; and I do not see what it can carry except that to achieve the fall of man was the mysterious purpose of God.

As the speech goes on, the intentions of God towards man are shown at their most horrible. After a first attempt by the Christ to soften the prospects before Adam, God retorts 'Die he or justice must'; also God talks here in off-rhyming couplets to set your teeth on edge, as Wilfred Owen did to describe the horror of the first world war:

> This my long sufferance and my day of grace
> They who neglect and scorn, shall never taste,
> But hard be hardened, blind be blinded more,
> That they may stumble on, and deeper fall.

But this tone is needed to prove that the offer of sacrifice by the Christ actually wins God over; after that his tone is immensely different.

Young Medieval Aristocrat

The words given to the Christ by Milton are not morally upsetting, like the words of the Father; the Christ talks like a young medieval aristocrat eager to win his spurs. What is surprising is that throughout the long scene in Heaven, even when the angels sing in his praise, there is no mention of the crucifixion. At the end of the poem the harsh angel Michael foretells the crucifixion to Adam, and does not speak of it as a torture, only as shameful and accurst. Even here the Christ is praised for accepting lower-class status and sordid tiresome work, not torture. It is hard to realize that Milton did this on purpose; you may say he is shockingly sublime about the crucifixion. But he is consistent; none of Milton's heroes would allow torture even to enter their minds as a consideration when they are making a choice. We actually cannot remember that his devils are supposed to be all the time in bodily agony; it has no effect upon them at all. This fierce blaze of moral splendour must, I am afraid, be called unreal; but the effect is that the torture-horror side of the religion is a thing Milton refuses to dirty his fingers with.

We next have the very splendid speech of the rejoicing of the Father at the son's choice of sacrifice:

> because in thee
> Love hath abounded more than glory abounds
> Therefore thy humiliation shall exalt
> With thee thy manhood also to this throne.

* Previous talks were published in THE LISTENER on July 7 and 14

Here shalt thou sit incarnate, here shalt reign
Both God and man, son both of God and Man,
Anointed universal king; all Power
I give thee: reign all ever . . .

and so on. I had long felt that this is the only morally good bit of poetry Milton allowed to his God, but I could not understand why. M. Saurat believes that Milton regarded God as the Absolute; God is dissolved pantheistically into the matter of the universe, and only able to act through the agency of the Christ. M. Phelps Morand, on the other hand, thinks that Milton had been corrupted by his work as an official propagandist, so that he could only imagine God as a dynastic ruler like Cromwell or Charles I; God thinks it is his duty to tell lies so as to hand on his prestige to his son. These two French ideas, the one making the poem too absolute and the other too worldly, are I think both right. Milton had been printing for years the belief that his political party was proved to be right because God had made it win; so he had to feel puzzled about God after it lost, when he went into hiding and only escaped death and torture as it were by miracle. He had to warn his readers that God is somehow tricky to deal with. Plainly, he is at present still the God of the Old Testament; but the Cambridge Platonists are right in a way, because God will become what they say he is after the Day of Judgment. It is one of the likeable things about Milton that he would regard this as a practical and statesmanlike proposal, reconciling the different parties. Thus Milton's God is like King Lear and Prospero, turbulent and masterful characters but struggling to enter peace; also like Cromwell, genuinely bothered about how to get a good enough parliament so that he could allow himself to abdicate.

We happen to be able to follow Milton's intention about this speech of God, because we have his private theological treatise. There Milton disagrees with St. Paul, or rather he drastically reinterprets a text of St. Paul which he quotes there and again in the poetry of this speech by God. St. Paul says in an epistle 'God shall be All in All', and seems to envisage a complete totalitarian rule by God; but Milton manages to twist it so that God dissolves himself pantheistically into the matter of the universe. Milton thus insists that God will carry out his promise. The Bible calls us heirs and inheritors of God's Kingdom, and this can only mean that the Father will abdicate. There has already been an evolutionary step at the Incarnation, when the law of Moses passed away or was superseded, and there will be another after the Day of Judgment, when *all* law will be superseded. The speech of God, ending in a blaze of glory, says to the Christ:

Then thou thy regal sceptre shalt lay by
For regal sceptre then no more shall need;
God shall be All in All. But all ye Gods
Adore him, who to compass all this dies,
Adore the Son, and honour him as mee.

No Need for Power

The Son will not lay down his power after Judgment Day to return it to the Father, as St. Paul thought, but because 'sceptre then no more shall need', that is, power will no longer be needed by anyone, not even, therefore, by the Father. The good angels are called Gods here for the only time in the poem. Thus the phrase here 'all ye Gods' answers the claim of Satan; but the good angels will not really become Gods until they are absorbed into the mystical body of Christ. They will have to put up with having the blessed among mankind stirred into the brew as well, which they feel is a great indignity; but it is a long way off, and they will only have to meet a severely tested minority of mankind.

So God is giving away his own throne to mankind, and not merely saying that the Christ will be allowed to come back to the seat he has already, by the words:

Therefore thy humiliation shall exalt
With thee thy manhood also to this throne.

If one accepts this as Milton's central argument for justifying God, it clears up many minor oddities in the poem. For example, it explains why the angel blushed. Adam, at the end of his conversation with Raphael, confesses 'The trouble is, when my helpmeet wants me to do something, I actually tend to think it's the right thing to do'. Raphael scolds him severely for it, and Milton makes Adam round on the angel and say 'Here, what do you know about this? Have you got any sex?'; and the angel blushes and says: 'Well, yes, we do love each other'. He explains that they love by total interpenetration, but why should the confession make the angel blush?

A Step away from Total Union

Milton would be sure to have a sublime explanation, and it can only be that this private love takes them a further step away from total union with God himself. We know that God wants this union, because he commands it in the harsh words which began the whole sequence of events. God summoned all angels and pronounced:

This day have I begot whom I declare
My only son . . . your head I him appoint . . .
Under this great Vice-Regent reign abide
United as one individual soul
For ever happy; him who disobeys
Mee disobeys, breaks union, and that day
Cast out from God.

'This day have I begot' is again from the second Psalm, which appears to be an ancient coronation ritual; and I understand that theological opinion about the First Things was so unsettled that Milton could afford to treat the matter boldly. He makes God exalt the Son twice over, first at this challenge and then after the creation in the scene where Christ offers his sacrifice. It has been thought absurd for God to say there, 'All power I give thee', using the present tense. He had already given it in the speech that made Satan revolt, and he goes on that he will not give it till the Day of Judgment. The eternal gift of the Father to the Son will be delayed till the Last Day, and taken back the day after. Yes, but this is what Milton considered absurd in the argument of St. Paul; he is scrupulous in following Holy Writ, but we may be sure he means to give it a sublime interpretation. So far as God lives in time there are a number of steps by which the Son is exalted. But in this first gruff order to the angels, which God knows the angels will disobey, he is already saying that they must become 'united as one individual soul'; this can happen only at the end, when the blessed among mankind too become heirs and inheritors of God's Kingdom.

Milton considered it a basic truth that God did not create matter from nothing; matter is a part of God from which God has willingly removed his will. Spirit is a subtle form of matter, like gas for one thing, and the angels are the subtlest; so it is logical enough to suppose that they can love each other by total interpenetration, almost as if they were being drawn back into the substance of God. This is their chief pleasure, and indeed it is the only activity in which they do not feel slaves, but they know that it is a step away from unity with God. This then is the noble reason why the angel blushes when he is asked about love.

There had to be something inadequate about the good angels. Milton quotes in his treatise from the Book of Job: 'He put no trust in his servants; and his angels he charged with folly'; no doubt Milton's hatred of all priesthoods would make him specially keen on this text. God knew from his first creation of the angels that they would turn out inadequate, so that he shook all Heaven by vowing he would eventually create man. So the reader of Milton finds God engaged in a tricky political manoeuvre; he must make the surviving loyal angels accept a comparative loss of status while using the fallen angels to test men, severely enough to choose a minority who can be put above the loyal angels. We as mankind cannot feel offended by this, because it is so much to our honour. Milton expects us to judge such matters in terms of honour; we should think it beneath us to complain at the misery and corruption of our fallen world so long as it will lead to honour in the end for our species. A number of critics have insisted that the falls of Satan, Eve, and Adam were all due to pride; well, yes, but all actions in Milton are done out of pride, good ones too; he steadily insists that all God's actions are done for his own glory. But this does not make God greedy; what he is plotting for is to produce a universe into which he can conscientiously abdicate.

Ultimate Mystery

I think this must be the answer to the central question about Milton's God, which is: How could Milton think that the poem justified God; because it is regularly found, when we meet a difficulty in the poem, that the answer was especially sublime. Milton of course could not tell us *why* God needed to make all these characters fall before he could produce a universe so good that he could abdicate into it; that is an ultimate mystery; but he could put the mystery back into a region evidently beyond our judgment, and show the known activity of God as decently well intentioned though invigoratingly salty and rough. The reason why the poem is so good is that it makes God so bad, or rather so full of barbaric vigour. Our chief trouble nowadays, I think, is rather an accident: we find Milton's God astonishingly like Uncle Joe Stalin; the same earthiness and joviality, the same pretence of losing his temper and boasting afterwards he was under full control, the same real, lasting spite. The good angels are presented as a peasantry under a Communist Government, timidly but stubbornly resisting collectivization, and here too the state

has the high claim that it will eventually wither away. So we are tempted to doubt whether Milton's God ever will abdicate.

But the story is that he will, and the inherent democracy of this autocrat is somehow what makes his behaviour feel all right. We are sure at any rate that he does not enjoy the mass of torment which he is causing by his policy. Milton will not allow any hint of that. It merely does not bother God, as we realize when he permits himself his leering jokes. The coolness of making it all political, therefore, makes this God very much better, and we ought to accept the splendour of the brief bit of poetry, so that we believe he will carry out his noble aspiration, when he says:

> because in thee
> Love hath abounded more than glory abounds
> Therefore thy humiliation shall exalt
> With thee thy manhood also to his throne.

—Third Programme

Sarah Bernhardt and Eleonora Duse

By BEATRICE FORBES-ROBERTSON

THE two greatest actresses in Europe, in my youth, were Sarah Bernhardt and Eleonora Duse—French and Italian. I never, naturally, acted with them, since they acted only in their own language, but I met them both and saw them both playing.

Somerset Maugham, in one of his essays, says that when he was writing and producing his plays he met all the leading actors and actresses of his day, and the only one who gave him the feeling that he was in the presence of greatness was Duse. That quality of greatness came, I think, from an amazing spiritual attribute. Sarah Bernhardt was very great as an actress, but as a woman she was a little alarming and overwhelming. I had no complaint to make on the occasion when I was introduced to her—she was extremely civil to me. She was told that I was just playing Ophelia and she said very gracious things; but I felt behind all this graciousness the possibility of a tigress. Whereas I could never associate any of the felines with Duse.

An old friend of mine, the daughter of Alma-Tadema, the painter, told me that every year she went to Italy and stayed for a month or two with Duse, and she said: 'I'm filled with a kind of exaltation. Then I come home and after two or three months I say to myself that Duse couldn't have really been so marvellous as I thought her: next time I go I'm afraid I shall be disappointed'. And then, she said, she would go the next year and she was not in the least disappointed. The spiritual quality which pervaded Duse's acting was also so salient in her private life that people were refreshed. There was a kind of stillness about her. You felt with her that when she was interpreting a part, she was giving you the soul of the woman, the innermost depths, without the aid of any adventitious make-up or attitudinizing. She reduced acting to its simplest level, and you can only do that if you are very great, if what comes from you comes from some depths in you; otherwise the performance would not be interesting.

In youth she played in comedy, but tended more and more to tragedy as she got older. She had one unique experience: she played in an Italian translation of *Romeo and Juliet,* in the open air in Verona, at the age of fourteen. She could play various types of women, but I cannot see her playing tigresses or villainesses, whereas Sarah Bernhardt would have no difficulty in that respect whatsoever.

Sarah Bernhardt in *L'Aiglon* (1901)

Photographs: Enthoven Collection, Victoria and Albert Museum

Eleonora Duse in *Camille* (1893)

Sarah was very fond of animals; she had snakes and she also had a curious trick of keeping her coffin in her studio and taking her naps in it. When she went to America she travelled with two young bears, and the manager's wife told me that these young bears would roam freely about the sitting-room in Sarah's hotels, and would climb up on the breakfast table and leave their 'visiting cards' there. I don't think Sarah enjoyed Duse because she had doubts about whether she was greater than Duse. That thought would not have bothered Duse in the least. But when Duse came to Paris and played in *Camille,* one of Sarah's parts, Sarah was annoyed and wrote Duse a rude letter; and Duse was very grieved. Later on they made it up, but I don't think Sarah Bernhardt liked to think of any rival queen upon the throne. She was essentially the 'star' actress; she would produce a very bad play if it happened to have a good part for her.

Duse, on the contrary, specialized in the works of D'Annunzio, who was at that time considered to be a great writer for the stage and very important. We all know that she was extremely devoted to him and that he broke her heart, but that's in passing: she did try to produce plays of the first water. Sarah's range in plays was wide, from Racine right down to the worst type of Sardou. Her great writer was Racine: she did him magnificently; her Phèdre was famous. But she also played in a good many bad plays.

Sarah retained her 'golden' voice almost until the end, it was a remarkable organ. She could create a great romantic figure, wearing her robes and using this wonderful voice.

The first time I saw her play was in *Camille* at Her Majesty's, and I was about sixteen. In the final scene Camille is dying, when suddenly her lover Armand rushes in. He had cast her off in great anger and she had never hoped to see him again. From her couch Sarah saw him, and gave a cry of joy so utterly poignant that I burst into tears.

I remember seeing her in *L'Aiglon*, in which she played the poor, ill-starred young son of Napoleon, and she was already in middle life and had a good deal of *embonpoint*. The silhouette that she exhibited in tight breeches and cutaway eighteenth-century coat rather reminded me of some of the silhouettes of George IV when he was Regent. In a scene in which the young L'Aiglon is standing upon the battlefield, and there are all the ghosts of the dead French guard lying on the ground murmuring and muttering, she gives a tremendous diatribe, a long, long speech, all by herself on the stage. I venture to think that there was no other actress of that day who could have got away with it as she did.

When Ellen Terry had been on the stage for fifty years the public and her friends gave a benefit matinée for her, because she was very hard up. She had had great expenses with her children and never had any share in the profits of the Lyceum, only an ordinary salary. So this great matinée was given at Drury Lane, and 'stars' came to it from all over Europe. Caruso sang, Coquelin gave one of his inimitable little monologues; and upon the stage were all the dramatists, all the British leading women as well as all the actors, everybody connected with the stage that you can possibly think of. Sarah Bernhardt did not come, although she was fond of Ellen Terry as everybody was. But Duse came. She was a very delicate woman; by this time she was elderly, she was tired, and she travelled all the way from Florence to be present at that matinée, not to perform.

After everybody had done all their tableaux and their scenes from Shakespeare and from eighteenth-century comedy, and *Trial by Jury*, with all the dramatists as the jury, including Bernard Shaw, Pinero, and so on—after this was all over, the stage was cleared, a large golden throne from some pantomime was placed right centre, and all the actors and actresses and all the dramatists and everybody congregated on to the stage—the men in morning coats, the women in gorgeous hats with feathers and all the rest of it. There were some of the most beautiful women I have ever seen in my life, such as Lily Hanbury, Julia Nielson, and so on. The idea was that Ellen was to sit upon the throne and all the others were to group round her. But Duse was there, and Ellen put Duse on the throne. Duse would not sit on it either: she stood in front of the throne, which was raised up on three steps, and Ellen stood two steps down below her. She thanked all her friends who had come and who had helped in this wonderful matinée; then she turned to Duse and took Duse's left hand and kissed it and said: 'And Signora Duse, who has come all the way from Florence just to do me honour'. And everybody in the house wept.

In the wings I saw my uncle Forbes-Robertson and my uncle Norman Forbes standing side by side, and Duse was in the middle of the stage having various people introduced to her. And I heard this dialogue from my two uncles: 'Look at her. My God, she kills every beautiful face, she kills every pretty woman in the place'. 'There she is in a little black frock with just a little grey feather at the side of her hair—no make-up, no costume, nothing—all simple, and she kills everybody else on the stage'. 'What a miracle!' And those two men were literally dancing up and down with excitement. That was the only time I met Duse, and I shall remember it to the day I die. The impression that I had of the generosity and the sunniness of Ellen, and the extraordinary grace and spiritual quality of Duse are things beyond my power to describe.

Duse came of a very poor and obscure family in Italy, and was on the stage from early childhood. She was very Italian, with those beautiful dark eyes that only the Greeks and the Italians have, I think, in Europe. Sarah's eyes were not so good; Duse's you could never forget. She might have been some medieval saint, with a simplicity like the Poor Clares. Her beauty lay much more in her expression than in her features; whereas Sarah certainly in youth was extraordinarily handsome. Duse died in Pittsburg, old and poor. Sarah made a marvellous finish, because she had some disease which necessitated the amputation of one of her legs, but continued to play with only one leg: she played in a piece on the trial of Joan of Arc, in which she stood leaning up against a table throughout the scene of the trial. She was a tremendous sport—that was an effort that few people would have made—but I don't suppose that Sarah could envisage the idea of living without acting: she acted to the last. She was a very great actress; but for me Duse was supreme.

—Home Service

Three Poems

Faith Healing

Slowly the women file to where he stands
Upright in rimless glasses, silver hair,
Dark suit, white collar. Stewards tirelessly
Persuade them onwards to his voice and hands,
Within whose warm spring rain of loving care
Each dwells some twenty seconds. *Now, dear child,*
What's wrong, the deep American voice demands,
And, scarcely pausing, goes into a prayer
Directing God about this eye, that knee.
Their heads are clasped abruptly; then, exiled

Like losing thoughts, they go in silence; some
Sheepishly stray, not back into their lives
Just yet; but some stay stiff, twitching and loud
With deep hoarse tears, as if a kind of dumb
And idiot child within them still survives
To re-awake at kindness, thinking a voice
At last calls them alone, that hands have come
To lift and lighten; and such joy arrives
Their thick tongues blort, their eyes squeeze grief, a crowd
Of huge unheard answers jam and rejoice—

What's wrong! Moustached in flowered frocks they shake.
By now, all's wrong. In everyone there sleeps
A sense of life lived according to love.
To some it means the difference they could make
By loving others, but across most it sweeps
As all they might have done had they been loved.
That nothing cures. An immense slackening ache,
As when, thawing, the rigid landscape weeps,
Spreads slowly through them—that, and the voice above
Saying *Dear child*, and all time has disproved.

PHILIP LARKIN

(To be broadcast on July 24 in the Third Programme)

Picture of Loot

Certain dark underground eyes
Have been set upon
The vast emporiums of London.

Lids blink red
At glittering shops
Houses and museums

Shining at night,
Chandeliers of historic establishments
Showing interiors to Tartar eyes,

Certain dark underground eyes
Bearing bloodred sack
The wineskins of centuries

Look hungrily at London:
How many women in London?
A thousand thousand houses

Filled with the world's high living
And fabulous knick-knacks;
Each small glossy machine
By bedside or on table or in bathroom
Is the electrical soul of its owner
The finished heart responding

To needle or gentle current.
And still more houses, endlessly stacked
Asleep with people waiting

To be exploded
The world's maidenhead supine for breaking
By corpuscle Tartars

To whom a toothbrush
Is a miracle;
What vast looting

What jewels of fires
What great cries
And long convoys

Of robbed and robbers leaving
The sack of rich great London.

ALAN SILLITOE

Edith Piaf

Voice of one whose heart
Has mended with the years,
One who can stand apart
And laugh at life through tears.

Voice of one who has long
Outlived regret, outgrown
Hope, and at last is strong
Enough to stand alone.

A. S. J. TESSIMOND

The Listener's Book Chronicle

The Correspondence of Isaac Newton Vol. II. 1676-1687. Edited by H. W. Turnbull, F.R.S. Cambridge. £7 7s.

Reviewed by J. D. BERNAL, F.R.S.

THE PUBLICATION OF the second volume of *The Correspondence of Isaac Newton* comes appropriately to greet the celebration of the tercentenary of the Royal Society. For this volume contains the record of the appearance of Newton's own crowning work, *Philosophicae Naturalis Principia Mathematica*, the great watershed between the science of antiquity and of our own time.

To his contemporaries, and for long after, it represented the solution, in the one magnificent generalization of *universal gravitation*, of the major problem of the meaning of the celestial spheres. It was the definite completion in mathematical form of the task Copernicus had begun by aesthetic intuition, the definite break-away from a closed earth-centred universe full of arbitrary geometrical constructions and kept in motion by angelic spirits, to a sun-centred universe ruled by a single mathematical principle.

To the scientists of our time, the field of knowledge Newton closed with the *Principia*, or even the law of universal gravitation itself, are small achievements compared to the field he opened by providing the general mathematical method, that of the calculus or, as he called it, of fluxions or flowing quantities, which has in the last three hundred years provided the key to the problem not only of astronomy but of the whole of science.

But, though this appears still, as it did in his time, the magnificent achievement of a single mind, it is evident now that it is also a crystallization of the work of many minds banded for the first time in human history into conscious organizations for the pursuit of natural knowledge by experiment, of which the Royal Society, if not the only such body, was pre-eminent. The *Principia* which carries its *imprimatur* is at the same time its greatest monument.

The reader of the second volume of Newton's Letters will not be able to gain any coherent account of the mental workings which led Newton to his crowning achievement. But he will, by reading between the lines, be able to see something of the human factors that forced him to perfect it and divulge it much against his will and intentions. In this sense the appearance of the *Principia* is as much a social as an intellectual event.

The second volume of the Letters is edited with the same scholarship as the first, but it makes much harder reading as so much of it is mathematical. Apart from a very few and fascinating glimpses of Newton's alchemical and geological interests, it is centred on the two subjects, mathematics and astronomy, which occupy the middle section of his life from the age of thirty-four to forty-three. There are echoes of his other great interest—light—which filled the first volume, but this is mostly rather tedious controversy. Little can be said on the mathematical Letters: they contain classical enunciations of the binomial theorem and of the integral calculus.

The great theme remains the discovery of the theory of gravitation. On this the Letters throw little light, but that is precious. It is evident now that Newton had the essence of the theory in his head long before. He remembered what he had written on a piece of paper which he had lost but which turned up only a few years ago and was published in Volume I of the Letters. He was stirred into a new interest on the one hand by his long-standing rivalry of Hooke and on the other by the observations of Halley's comet with its extreme elliptical course.

Hooke, the experimental physicist, saw clearly that planetary motions must be due to an attractive force falling off as the square of the distance, but Newton, the mathematical physicist, could do more—he could prove it. This time, more disastrously than over light, they quarrelled, and bitter letters were exchanged. In his second letter, however, Newton inadvertently makes a precious acknowledgment of Hooke's contribution. Newton had claimed that the path of a body falling freely to the centre of the earth would be a spiral. Hooke said it would be an ellipse, and Newton grudgingly admitted he was right. In his own words 'yet I am not beholden to him for any light into y^{t} business but only for y^{e} diversion he gave me from my other studies to think on these things . . .'. Hooke at least deserves the honour of stimulating Newton to make the last vital contribution to the theory of universal gravitation.

From Raft to Raft. By Bengt Danielsson. Allen and Unwin. 21s.

Towards the end of 1956 Eric de Bisschop, a Frenchman living in Tahiti, set off with four companions on a raft to Chile. The object of this daring voyage was to prove a theory which was the absolute opposite of that held by Thor Heyerdahl of Kon-Tiki fame; that the numerous cultural parallels between Polynesia and South America were due to Tahitian sea rovers having visited Chile and Peru in pre-historic times.

The Chilean coast was reached in May 1957, but only after the raft had become unseaworthy and had to be abandoned three days before the completion of the voyage. This would have been enough for most people, but for Eric de Bisschop it was only the beginning. At Valparaiso he set to work to build a new raft and in February 1958 he and his companions set off up the coast to Callao. This two months' journey to Peru was in the nature of a trial run, and all having gone moderately well the party set off again a few weeks later. The intention was to sail the raft back to the starting point in Tahiti, but when they were well out into the Pacific everything began to go wrong: the raft, which was almost impossible to steer, was blown right off course, the crew became quarrelsome and near-mutinous, and Bisschop himself, who was sixty-eight years of age, became seriously ill. It became obvious that the raft was about to break up, but with incredible ingenuity a new and lighter one was constructed from bits and pieces and by partially dismantling the original craft as she drifted out of control across the ocean. It seemed only a matter of time before the whole party was lost, but with incredible luck they managed to land on an inhabited atoll in the Cook Islands, whence they were eventually taken home to Tahiti by a French patrol boat.

Eric de Bisschop was too weak to support the difficult landing through the reef at Rakahanga and was dead by the time his companions got him ashore. He was not in good health even when the party set sail from Callao and soon found that he could do little beyond encourage his shipmates not to give up. The real hero of the party was Alain Brun, but for whose powers of leadership and professional knowledge of navigation the expedition would certainly have perished. It is understandable that at first Brun was unwilling to talk about this fatal expedition, but eventually the story was written down by Bengt Danielsson who was himself a member of the original Kon-Tiki expedition in 1947. Because of his own experiences of raft navigation Mr. Danielsson has been able to record this remarkable and courageous journey (twice as far as that of the Kon-Tiki) with such vividness that the reader is never conscious that he is telling the tale at second hand. I found it even more exciting than the Kon-Tiki story.

JOHN MORRIS

Thomas Arnold. By T. W. Bamford. Cresset Press. 25s.

'But is he a Christian?' This question at once innocent but feline was asked by Newman about Arnold. At first sight we might regard such a question as positively impudent when applied to one who, speaking to the whole of Rugby School, could say: 'It is not necessary that this should be a school of three hundred, or of fifty boys; but it is necessary that it should be a school of Christian gentlemen'. Armed with the weapons of expulsion, the stick, and the pulpit, Arnold in his long reign at Rugby (1828-1842) sought to realize the ambition of old Squire Brown—'if he'll only turn out a brave, helpful, truth-telling Englishman, and a Christian, that's all I want'. Can we believe that this servant of the Lord did not really believe in his Master and that, like his patron the Duke of Sussex, he might have written in the margin of his prayer-book, opposite the Athanasian Creed—'I don't believe a word of it'?

Not the smallest merit of this outstandingly good biography is that it brings the reader face to face with this problem. Now it is obvious that for our forefathers of the early nineteenth century the Church was an enormous temptation, for it was still the principal avenue to influence and affluence. We might compare it with that dim, new world of power in our own day—the deeps of chartered accountancy. No aspiring accountant could believe much of the contorted rubbish of which he has to make himself master, but disbelief is smothered by looking ahead to the time when some wealthy company will call to its board a member of the new expertise. Something of the same kind happened to Arnold: he was advised by his friends and the Bishop of Oxford that the Church was

far more important than details and, in spite of doubts on the Trinity, he was ordained. This of course was a serious matter, and it is recorded that a Cambridge undergraduate, with the sensitiveness of his kind, fainted when he heard that a friend of his was afflicted by similar doubts. But Arnold—his body filled with all the hormones and vigour of youth as Mr. Bamford expresses it—was certainly not going to booze and twaddle his life away in an Oxford common-room, and falling with characteristic violence in love he separated himself from the celibacy of Oxford as a private coach. Rugby followed. Perhaps some of the doubts remained. He was earning at least £3,500 a year, and most mortals would have been content to jog peaceably down that golden road to the glory of the episcopal bench.

But there was a curious streak of impetuosity in Arnold, alarming but endearing: just as he could not resist giving a perfectly innocent Rugby boy eighteen strokes with the cane, so he could not resist leaping into religious controversy and in the *Edinburgh Review* labelling the Tractarians as 'Oxford Malignants' and accusing them of 'moral wickedness'. One of the finest members of the laity in the Church (Joshua Watson) said that Arnold's 'hand was against everyone' and that he was 'utterly without reverence for what was time-honoured'.

His political views were no less violent than his religious ones: in writing to his favourite pupil A. P. Stanley he once said: 'My love for any place, or person, or institution, is exactly the measure of my desire to reform them'. His outlook was truly Whiggish, and the sad thing was that Melbourne and the Whig Cabinet, though anxious to reward him with a bishopric, never felt strong enough to overcome the prejudice against him within the Establishment. Mr. Bamford makes clear that just as in the larger world Arnold made difficulties for himself, so in the smaller world of Rugby School and Rugby town he was the creator 'of storms that rage outside our happy ground'. This is a serious book, beautifully put together and based on sense and industry: we should all be the better for reading it.

ROGER FULFORD

A New Earth. By Elspeth Huxley. Chatto and Windus. 30s.

In *The Sorcerer's Apprentice* Mrs. Huxley described the disastrous destruction of the soil of East Africa by primitive methods of cultivation. Her new book is about the work that has been done since the war in Kenya to restore fertility and improve standards of African farming. Starting with plans for the settlement of ex-soldiers, this work was greatly expanded when the United Kingdom contributed £5½ million in 1954 towards the 'Swynnerton plan' for African agricultural development.

The provision of water and the rehabilitation of pastures are technical matters to be dealt with by specialists employing labour and machines; the crucial question is whether people will agree to the changes in land rights and in farming routine that are needed if they are to profit by the technical improvements. To prevent deterioration, holdings need to be consolidated, grazing fenced, and the size of herds limited. To raise the farmer's income entails the introduction of new crops and improved stock. Remarkably encouraging results have been achieved in some places. Many are illustrated in Mrs. Huxley's photographs, some of them tellingly juxtaposed with pictures of the same scene a few years ago.

Most of the cattle people have now accepted, at least in part of their country, controlled grazing and the annual sale of a quota of stock. In Kipsigis country fencing is virtually complete, and 'almost every inch is now enclosed within neat hedges of Mauritius thorn'. A daring scheme has been started for growing tea on small holdings. A Tugen farmer employs ten labourers on a 'miniature ranch', and Elgeyo get improved stock by artificial insemination.

Coffee is grown by a co-operative society on Mount Elgon, pyrethrum by another in Kisii, tobacco by the Kamba. The traditional Kamba work groups turn out to build dams and terrace the land. Land holdings have been consolidated among all the agricultural peoples, though only the Kikuyu have accepted enclosure 'with the momentum and fervour of a religious revival'.

The future of the most successful of these enterprises is precarious, depending as they do on strict regard for the prescriptions of technical efficiency. Will the new holdings be subdivided in the next generation, till fragmentation is as bad as ever? Will African co-operatives be as stern with their members as they ought? Who will maintain supervision if European technicians are withdrawn?

Like these devoted technicians, and like the old Kamba lady who mustered the women to build a dam when the local Youth League were trying to sabotage it, Mrs. Huxley has 'very little patience with the young politicians'. Her tone in writing of them suggests that they are wholly self-seeking, a view which is more open to question than most of those she expresses. A sound economic basis is indeed essential for a self-governing Kenya, but this does not make the demand for self-government meaningless. This book does show, however, the crucial importance of improvements which have depended up to now on the knowledge and initiative of European technicians.

LUCY MAIR

J. Middleton Murry: Selected Criticism, 1916-1957. Chosen and edited by Richard Rees. Oxford. 30s.

It was an excellent idea to open this selection with an essay on 'The Function of Criticism', which, though written in 1920, was Murry's first explication of his critical principles. The succeeding studies, ranging from self-contained essays on Congreve and Molière, Spenser, Stendhal, Rousseau and Whitman, to substantial excerpts from the books on Dostoevsky, Keats and Shakespeare, show how consistently and fruitfully he adhered to these.

Like Arnold and Coleridge, Murry followed Aristotle in treating art as 'a means to the good life'. Unlike them, he had to find out for himself what 'the good life' was. Hence his initial sympathy with the Russians. This only meant, however, that his approach to literature was deflected by no preconceptions; that he surrendered himself unreservedly to each work that came his way; and, not content with defining its impact (often with exquisite precision) and investigating how it had been achieved, invariably went on to evaluate it by the 'quality of soul' it induced.

It was because he was concerned less with what was 'historical' or merely 'contemporary' in their works than with what was 'for all time', that Chaucer, Goethe, Wordsworth, were as actual to him as Lawrence or any of his coevals—if anything, indeed, more actual, since the further he grew the fewer of these spoke to his condition. (In the end, he told T. S. Eliot, the only author he could still read with undiminished excitement was Shakespeare.) It was for the same reason that his judgments of contemporaries have so often stood the test of time. The 1921 review of *A la Recherche du Temps Perdu*, reprinted here, is but one of many testifying to his early recognition and encouragement of writers, French and British, who have long since come into their own.

In all this, he was very 'uncontemporary'. Just as the universality of his criterion enabled him to relate literature to the lives of unsophisticated people, who might otherwise never have appreciated it, so its permanence raised the best of his criticism above the flux of fashion. There is little in the masterly essay on Lessing that could not be applied to himself—and least of all the conclusion: 'His work is a monument to the validity of his own unshakable conviction that not the possession of truth but the passion, the sincerity, and the tolerance with which it is sought, is the noblest achievement of humanity'.

To make a selection from this criticism which should illustrate both its range and development cannot have been easy. As Sir Richard Rees points out in his introduction, a much larger volume would have been possible without any sacrifice of quality: and no doubt every reader familiar with Murry's works will regret one or another omission. But that applies to all anthologies. For those who are not so familiar, no better introduction could be desired, either to his literary studies or to his thought as a whole.

F. A. LEA

Political Realism and the World Crisis By Kenneth W. Thompson. Oxford, for Princeton. 40s.

American Foreign Policy: Theory and Reality. By Louis J. Halle. Allen and Unwin. 25s.

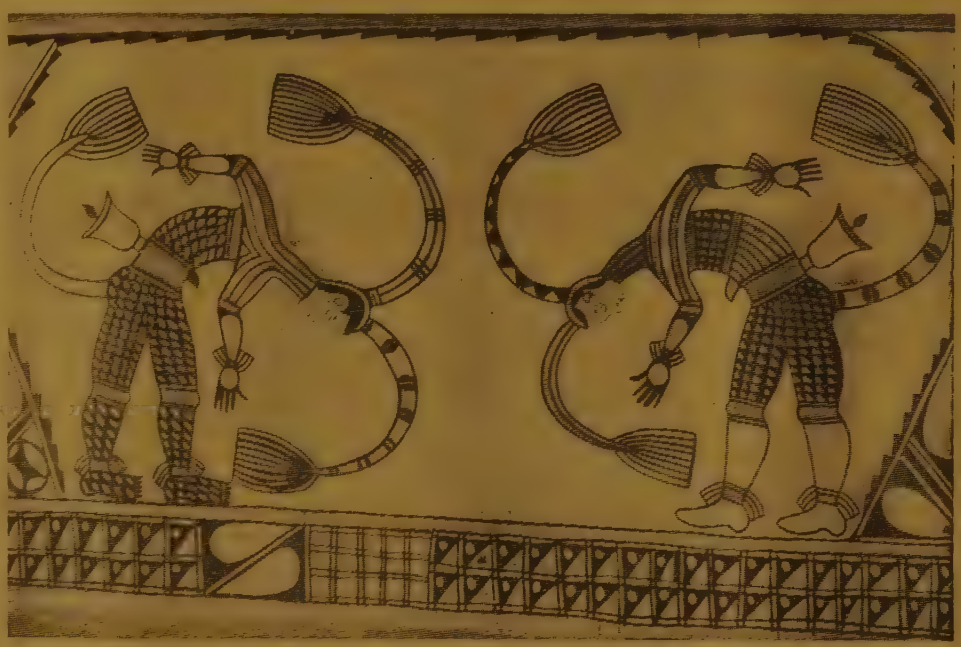
During recent years a growing number of highly intelligent Americans have been thinking and writing about the basic problems of their country's foreign policy. Too diffuse in their interests to be called a 'school', yet sharing too much common ground to be dismissed as disgruntled individuals, they provide the most lively and penetrating analysis of international problems which can be found in the world today. Yet apart from Mr. George Kennan their books are little known in this country, and Mr. Thompson's survey of their work is particularly welcome. His book is readable (though the style is sometimes a little flat) and while he is concerned mainly with other men's ideas his own comments have the edge of conviction not the detachment of an uncommitted expositor.

A composite portrait of the political realist is not hard to draw. He is in revolt against the old American notion that ideals are a substitute for hard diplomatic bargaining backed by appropriate force, he regards the Open Door policy in China as the supreme symbol of diplomatic folly, he condemns both Woodrow Wilson and the isolationists, he compares F. D.

Roosevelt unfavourably with Winston Churchill, he shows evident respect for the supposed merits of European conservatism, and he believes (in Mr. Thompson's concluding words) that 'the chief virtue of political realism lies in the unqualified emphasis it would place on [the] techniques and methods' of diplomacy. Machiavelli too sought peace in a time of trouble through statecraft, and Mr. Thompson would probably invoke his authority were it not always open to misinterpretation.

By most of these tests Mr. Halle is a political realist, yet he has perhaps been too close to the making of policy to be quite so confident about the virtues of technique. He was formerly a highly placed State Department official and has seen 'words of his composition cast in imperishable bronze over the name of a famous statesman'. He has written a more uneven, less scholarly and more exciting book than Mr. Thompson. His broad historical review of the roots of American foreign policy may well annoy professional historians, but where he has studied a problem closely or reflected upon his own experience he always has something important to say. His three chapters on why America acquired the Philippines, based upon a close acquaintance with the documents, form a penetrating and suggestive study. His later chapters are full of interesting observations and the keynote is struck in the statement that 'foreign policy addresses itself . . . to the external world as legend, to the external world which men create in their imaginations'. In diplomacy, proceeding from the false to the unknowable, there is always a limit to 'realism' and improved technique may be helpless without greater wisdom. Perhaps Mr. Halle would be less surprised than Mr. Thompson to see an escape from the narrowing bounds of world crisis discovered by a statesman whose ideals had run ahead of his political sense. Both of these books are worth reading by anyone who wishes to explore not only modern American foreign policy but also the assumptions underlying all foreign policy.

W. R. BROCK



Part of a wall-painting done by an Ibibio artist for the Ibo tribe of Nigeria
From 'African Design', by Margaret Trowell (Faber, £2.10s.)

The Everlasting Circle

By James Reeves. Heinemann. 25s.

Nothing could better illustrate Disraeli's 'two nations' than the chequered history of English folksong. Most of the best of the Scottish material had already been collected by the middle of the nineteenth century, and much of it fifty or more years before. English ballad, as a branch of antiquarianism, had been deeply studied since the days of Percy, and Child's monumental collection was shortly to appear. Even the street-songs of the city had been spasmodically collected, from the days of Pepys onwards, by 'amateurs' and by social workers. But the wealth of native song to be heard in any country tavern went unregarded, apparently considered so artless and coarse as to be below literary notice; and it was actually not until 1887 that Baring-Gould, the first at all considerable figure in the field, began his collections. He, one must note, was primarily a musicologist; and so were all his successors, Hammond, Gardiner, and Cecil Sharp. The result was that, while the tunes were treated with every reverence, the words received none. Baring-Gould himself refused to transcribe anything he thought coarse—and he had a Victorian sensibility in these matters. The vast bulk of the remainder he considered as just not too indelicate to be recorded, but far too much so to publish. He therefore made up insipid emasculate parodies of his own, and let them loose upon an unsuspecting public. The others took a sterner view of their editorial responsibilities, and no doubt a less rosy view of their own literary powers; but they too were too frightened to bring the texts they meticulously recorded into the harsh light of common day.

From this ridiculous situation (the first unamended folksong texts were, unbelievably, not published until so late as 1948) Mr. Reeves is doing more than anyone to rescue us—or more precisely to rescue the 'folk' of England from the sweetly sugary townee-inspired character that has been falsely thrust upon them. *The Idiom of the People* (1958), his collection of unamended Sharp texts, is now followed by this second gathering, from the stores of his three predecessors. The songs vary from such ribald snatches as

> Four and twenty apostles all of a row,
> Four and twenty apostles all of a row,
> Abram begot Isaac,
> Isaac begot Jacob,
> Jacob begot the twelve tribes of Israel.
> Devilish hard time.

to the solemn simplicity of

> A gardener stood at the gate
> With cypress in his hand,
> And he did say, Let no fair maid
> Come into Dead Maids' Land.

It must not be considered as a discommendation to remark that their interest is perhaps even greater to sociologists than to poetry readers.

The only real criticism of this deeply fascinating volume is one that Mr. Reeves would certainly make too: time after time the words, bare and angular on the page, cry out for their melodies. Surely in this technical age it should be possible to discover a method of music reproduction that would not raise costs prohibitively?

HILARY CORKE

The Diary of Benjamin Robert Haydon, 1808-1824. Edited by Willard B. Pope. Oxford. 2 vols. £8

Benjamin Robert Haydon was, as one may say, a genius without talent, or at least without the kind of talent that his genius demanded. Vain as Courbet, quarrelsome and querulous as Blake, he lacked their greatness and we cannot forgive the man for the sake of the painter; he remains, in consequence, something of a figure of fun and an easy butt for the critic. In the eyes of his contemporaries he *was* a great man; Wordsworth, Keats, Hazlitt, and Leigh Hunt joined in praising him; few artists have ever had a better press. Today, although much of his painting seems to us worthless, there are still some canvases that we can enjoy. They are not those which he would have had us admire, but rather his essays in *genre*, such as 'May Day', 'Waiting for *The Times*', or 'The Mock Election'. The greater part of his academic antagonists—Sir Martin Archer-Shee, Hilton, Phillips and the like—are forgotten, but Haydon will always have a certain reputable position in English painting. He was, moreover, something of a writer and something of a man of action. He did much to keep the Elgin Marbles in this country when a great part of cultivated opinion was ready to reject them; he did a great deal to establish a system of state art education and of state aid for the arts. Above all, he was the last, and in some respects the greatest, of the academic theorists. His memoirs have a particular value as the records of a man who was intimate with some of our greatest poets and who was active in both the literary and the artistic worlds of London at a momentous period, but they would still have been valuable if Haydon had written only about himself.

These two volumes, covering the years from Haydon's first disastrous quarrel with the Academy to his first imprisonment for debt, have all the virtues that Tom Taylor's edition lacks. They give a careful transcription of all that is left of the text (a fair number of passages, mainly, it would seem, those dealing with Haydon's many fornications, have been deleted by previous owners.) The text is carefully and exactly annotated and scrupulously presented. In fact the diaries could not have fallen into better

hands and scholars should be grateful to Professor Pope. The public at large may at first sight be less enthusiastic, and an abridged edition with many more of Haydon's lively drawings would be very welcome. For there are lengthy passages, speculations on anatomy and proportion, reflections upon religion, patriotism and other sublimities, which Haydon treats with dreadful gusto and at great length. But if the reader will persevere or skip in a judicious fashion, he will find much that is readable and, indeed, captivating. Haydon's writing suddenly comes to life when he describes a street accident; a scene on Hampstead Heath; an excursion to Richmond; a walk with Keats; lunch with Hazlitt; Sir Thomas Lawrence listening to a recitation by Mrs. Siddons, his mouth full of toast, constrained to 'bite it by degrees and then stop, for fear of making too much crackle'; above all, the compelling and tragic picture of Haydon himself—vainglorious but introspective, veering from insane optimism to terrifying despair, and, in this volume, passing from the high hopes of youth to a gradual dreadful awareness of his predicament. Haydon's faults and virtues as a writer are, in fact, very similar to those which he displays in his painting. The grand style, the enormous history, the sublime and the terrible, lead him from his natural bent, which lies in the direction of Hogarth, the novelists and everyday life.

And yet, even in the sphere of academic art, he gained some victories, although they were useless to him. If one can bring oneself to study those long passages dealing with anatomy, the antique and human proportion, one may discover a theory of ideal form which avoids the Scylla and Charybdis between which all previous teachers had come to grief. He steers clear of the extravagances of the mannerists and he avoids the prosaic 'average form' of Reynolds. He finds his solution in a theory of human function and he supports it with the splendid example of the Elgin marbles. It was no small achievement to find a convincing answer to that secular riddle, but the answer came too late—the academic theory was dying and even Haydon survived it. It led him into an impossible pursuit which he ended, horribly, with a razor and a bullet; but already, as an artist, he had destroyed himself.

QUENTIN BELL

New Novels

On the Market. By Austin Stevens. Cape. 16s.
The Gamesters. By Peter de Polnay. W. H. Allen. 15s.
Watcher in the Shadows. By Geoffrey Household. Michael Joseph. 15s.
Equal Partners. By James Tucker. Chapman and Hall. 14s.
The Subterraneans. By Jack Kerouac. André Deutsch. 10s. 6d.

FOUR OF THESE five novels under review would have delighted Balzac, for each of them is fiercely and Balzacianly occupational. Mr. Stevens is concerned with the Stock Exchange; Mr. de Polnay with the tables; Mr. Household, as usual, is preoccupied with escapes and hurried journeys, yet he is also in his own way immersed—this time in country wild life. Mr. Tucker is concerned with the provincial press. Mr. Kerouac—but Mr. Kerouac is not in this same craftsmanlike line, and can be left to be dealt with later.

I had not read Mr. Stevens's previous book, *Time and Money,* but I shall certainly do so after reading *On the Market.* This is expertise with a vengeance, a beautifully pitched tale of faith and betrayal on 'Change, couched in the dialogue idiom of Angus Wilson—like Wilson's early short stories, the action is set ten years back, in the days of the Korean war and the Attlee Government—and moving at the speed of Mr. Eric Ambler's Jaguar. To and fro it swings, from provincial splendour in Derbyshire to the miseries of the just man involved in murky dealings, sitting in his Throgmorton Street office. The nods and grunts of the market, salacious nights in Rio with an old gin-rotting oil representative who has not exactly gone native but is no longer visited; his brooding immature daughter, who reads the works of Somerset Maugham in order to understand her father's friends; the Rubensesque queen of the provincial mill-town dustily in bed with her favourite TV king—the book pulsates with a kind of life that is unusual in the contemporary English novel. If its hero is a bit of a stick, its villain is masterly. Mr. Stevens is a writer to be kept in mind.

Mr. de Polnay has a way of pleasing and disappointing that is vexing to the indolent reviewer, but continues to cause excitement to his admirers. This time he has done admirably, plunging us almost immediately into an avidly tragi-comic gambling saga. The scene is Cannes and the betting protagonist an otherwise wide-awake young tory politician named Jeremy Gray, whose doctor has told him to come to the Riviera for a short spell after his beastly pneumonia. 'You English prig', thinks Mrs. Rebecca Fysk on first being introduced, and she is darned right—at least until Mr. Gray gets to the tables. After that disasters—of the kind that attended Dostoevsky at Baden and produced *The Gambler*—supervene. I shall not attempt to rehearse them here. Instead, I would like for a moment to dilate on Mr. de Polnay's style. It is a subject capable of a good deal of discussion, for nothing that this author has written lacks his own Buffet-like flourish, but it will have to be succinctly treated here.

In an early book of profiles that is a model of socialite reporting, Mr. Beverley Nichols wrote of the late Michael Arlen that 'there was once a famous authoress who, asked whether she did not think the young novelist "brilliant", replied, "No, brilliantine"'. Nichols explained this rather spiky remark by declaring that Arlen was in a way 'a famous authoress himself, by which I mean that his style is far more feminine than that of most women'. This applies very much, I consider, to Mr. de Polnay, who is a kind of highbrow Michael Arlen with the same Mayfairish dash and zest, the same green heart and a good deal more content. At his worst—and this passage shows Mr. de Polnay very much at his worst—he is pure Arlen:

> She had been a formidable beauty before she and her husband parted. He had been an M.F.H. hunting a fashionable pack in the Shires in the early 'thirties, and his wife rode to hounds four days a week, a strikingly Junoesque figure on horseback, always riding sidesaddle, always perfectly mounted; the husband had once wanted to horsewhip a young follower of hounds who was overheard saying that he pictured Louis XIV hunting in one of his royal forests as the spit of stately Sylvia Howett. There was something in what he said.

Though Mr. Household, as he would be the first to admit, derives plainly from John Buchan, he is sovereignly his own man and he has seldom shown himself more so than in *Watcher in the Shadows.* He has just that mixture of tautness and repose in narrative—those necessary *longueurs* while the hero is lying a day in the bare Buckinghamshire countryside observing his quarry through binoculars—that Buchan in his turn borrowed from R. L. Stevenson. In the present book his incidental characterization is better than it has been for a long time. There is a splendidly intelligent and peppery retired admiral; a Schonbrünn *grande dame* turned English riding-mistress; and a retired military man, a former liaison officer with the French Armies, the very essence of reminiscing pomposity. Really excellent throughout, and in Mr. Household's best and original vein.

Good novels—or even bits of novels—about newspapers are far to seek nowadays. The P.H.S. passages in *Pendennis,* C. E. Montague's superb *A Hind Let Loose,* Mr. Waugh's *Scoop* and the thrillers of Mr. Robert Harling about complete the list. In *Equal Partners* we have found an addition. 'Here is a fascinating story of the provincial newspaper world, told in the first person and a personal idiom'—and for once a publisher's blurb is speaking the simple and entire truth and sticking to it. It only remains to add that Mr. Tucker writes briskly and well and keeps his plot simmering admirably. An unpretentious but genuine novel that will give pleasure far beyond El Vino's or that professional White's, the Liverpool Press Club.

I have admired Mr. Kerouac fleetingly on occasion but I cannot say that his present effort much impresses. The trouble about the beatniks is that they are getting too beat, too televised and lionized, too incommunicable altogether. (They would do well to take a hint from their intellectually superior counterparts, the pataphysics of Paris who are jollier, far uncannier and rarely fail to make their most unpataphysic readers see the point.) The present novelette is a love story from the beatnik Great Beyond. It carries a picture of Miss Leslie Caron on the dust-cover, but I predict that even the M.G.M. lion's roar is not going to save this one.

JOHN RAYMOND

Bridge Forum

Inter-County Bidding Competition—Heat III

By HAROLD FRANKLIN and TERENCE REESE

THE THIRD HEAT of the inter-county competition was broadcast in Network Three on the evening of Tuesday, July 19. The competitors were Mrs. N. D. Campfield and Mrs. M. Frith, of Yorkshire, and Mr. A. L. Fleming and Mr. J. Griffiths, of Kent.

The players began by answering five questions all relating to the following hand, held by South at love all:

♠ Q J 9 2 ♥ K J 10 3 ♦ A K 9 3 ♣ A

SOUTH	WEST	NORTH	EAST
(1) ?			
(2) 1H	No	1NT	No
?			
(3) 1H	No	1S	No
?			
(4) 1H	No	2C	No
?			
(5) 1H	No	2NT	No
?			

These were the answers adjudged best:

(1) One Heart, with a consolation mark for One Diamond. On three-suited hands it is wise to consider which suits one intends to bid. If the intention is to bid all three suits the general rule is to open the 'suit below the singleton', which in this case would be spades. On this hand, however, if partner does not bid spades over one heart, South will not want to introduce the suit himself. Better, then, to conceal the indifferent major suit.

(2) Two No Trumps, with a consolation mark for Two Diamonds. In terms of points the hand justifies a raise in no-trumps, and there is no good reason for introducing another suit. Two Diamonds is a slight underbid.

(3) Three Diamonds, with a consolation mark for Four Spades. The force of Three Diamonds, to be followed by support for spades on the next round, accurately expresses both the strength and distribution of the hand.

(4) Three No Trumps, with a consolation mark for Two Spades. After a response at the range of Two, South has enough to bid game. Two Spades is admissible, though not valuable, but Three Diamonds, which may be followed by a raise to Four Diamonds or a jump to Four Hearts, runs the risk of by-passing the best contract.

(5) Three No Trumps. That must be safe and there is no point in making a bid that may tend in some other direction.

At the end of this part of the 'quiz' the Yorkshire pair had a lead of 12 points against 9. The players were then asked to bid the following hand, dealt by East at game all:

WEST	EAST
♠ J 2	♠ A K 4 3
♥ A Q 10 7 5 4	♥ 2
♦ K 4	♦ Q J 10 9 3 2
♣ K 7 6	♣ 3 2

Top marks were awarded for a good stop in Three Diamonds. This was achieved by the British pair in the World Olympiad. East passed originally, and the bidding continued: One Heart—Two Diamonds; Two Hearts—Three Diamonds; No Bid.

For Yorkshire, Mrs. Frith passed as East and then responded One Spade to the opening One Heart. The bidding continued: Two Hearts—Three Diamonds; Three Hearts—No Bid. This contract scored 6 points out of 10.

The Kent pair finished in the same contract after the bidding: One Diamond (by East)—One Heart; Two Diamonds—Three Hearts—No Bid. Thus Yorkshire kept their lead of 3 points and so entered the next round.

Though the bidding of both pairs is open to criticism, it was good to stop short of a game. In the Olympiad the French team reached Four Hearts and went four down.

CRITIC ON THE HEARTH

Weekly comments on B.B.C. programmes by independent contributors

Television Broadcasting

DOCUMENTARY

Losing Their Bearings?

THE NAMING last week of the chairman of the committee which is to inquire into the future of television and sound broadcasting caused me to raise my critical sights. Inquiry implies at least the possibility of change, and although Sir Harry Pilkington will be concerned with the larger problems, it is the individual programme coming daily into our homes—its intention, its quality, its worth—that gives the larger problems their importance. I found myself watching

A warrior seen in 'Savage New Guinea' in the series 'Travellers' Tales' on July 13

John Cura

the rest of the week's programmes with this in mind.

'Panorama' (July 11) got good marks chiefly on the strength of Ludovic Kennedy's interview with the American high-pressure church-fund raiser. Kennedy asked most of the questions one wanted him to, and he was more relaxed, less aggressive than he has sometimes given the impression of being. Evidently the assignment was one that he relished, and he made us relish it, too. The American was disarmingly frank in some of his replies, as when he agreed that his organization charged a parish about £2,000 for conducting a campaign on its behalf; and surely less than candid in others. But I am prepared to forgive a man much who begins a sentence in a television interview with the word 'Confidentially . . .'

Michael Ayrton's statement of aims and faith as an artist ('The Artist Speaks', July 11) was at times almost moving—while he spoke. Afterwards you realized that he had told you little that his work had not already revealed. As the artist communicates through his work, this was to be expected, so the question arises: Can this new series (five more are planned) contribute anything of real value to our understanding of the artistic purpose? Ayrton is able to express himself verbally more clearly than some artists, and his thinking aloud was well worth overhearing. Later programmes in the series will show whether he is as rare in this respect as I am inclined to think.

Patrick Moore's 'The Sky at Night' (July 11) is one of those programmes (there are several) which seem uncertain of the audience they are intended for. It is screened usually after ten o'clock, a time traditionally allotted to items with less than mass appeal, but most of its material and the whole of its delivery are of about sixth-form standard. I should have thought that there was room for a more advanced treatment of astronomy—advanced, by the way, not only in subject matter but in the quality of the devices used to aid our understanding. The models Moore had to make do with last week were a disgrace to a service which finds the money to mount an endless succession of inane panel games on a scale which, if not lavish, is often only one degree less.

The visual aids in the last instalment of 'Life before Birth' (July 12) were also not as effective as they should have been. The working model of the blood-flow of a newly born child seemed unnecessarily mechanical in its straight lines and right angles, looking like nothing so much as a borough engineer's mock-up of a new water-works. True, the point about the opening and closing of certain valves was made, but it required a greater effort on our part than we should have been called on to make to relate what we saw to the red, warm body of the infant gasping for its first lungful of outside air. This apart, the final instalment played its part in earning for this series the verdict: didactic television at its best.

'The Brains Trust' (July 14) is another programme that seems to have lost its bearings. In its original, pre-war, sound form the members of the panel delivered in turn their oracular answers to listeners' questions. Nowadays they tend to hold a conversation among themselves. The change is not always for the better.

For last week's panel the producer had reverted to the former practice of having four members. The gain was more apparent than real, because Dr. Plumb agreed with most of what Mr. Ayer said, and by this time (it is one of the penalties of being an oracle in this age) Ayer's reaction to almost any question is fairly exactly predictable. Fortunately, Eugene Rostow from the United States and Paul-Marc Henry from across the Channel were able to provide sufficiently opposing views to keep argument going.

PETER POUND

'Walking' movements of a day-old baby—a reflex action which disappears after a month or two: from the fifth programme of 'Life Before Birth'

John Cura

DRAMA

Penelope and Tony

WHETHER AUTHORS secretly hanker after the creation of popular characters I don't know. Yet if they do, and the public does become infatuated with a particular character, the author all too often finds himself at odds with their demands. Sir John Falstaff plagued Shakespeare. Sir Arthur Conan Doyle was so driven to distraction by his morphine-addicted private-eye that in a madly impetuous moment he hurled him over the Reichenbach Falls. Nevertheless, it would be a brave young writer who entirely ignored his mail and continued with his schedule. So I find it natural enough that Mr. Willis Hall, whose trilogy of seaside plays was well received last summer, should succumb to public demands. Natural, but regrettable.

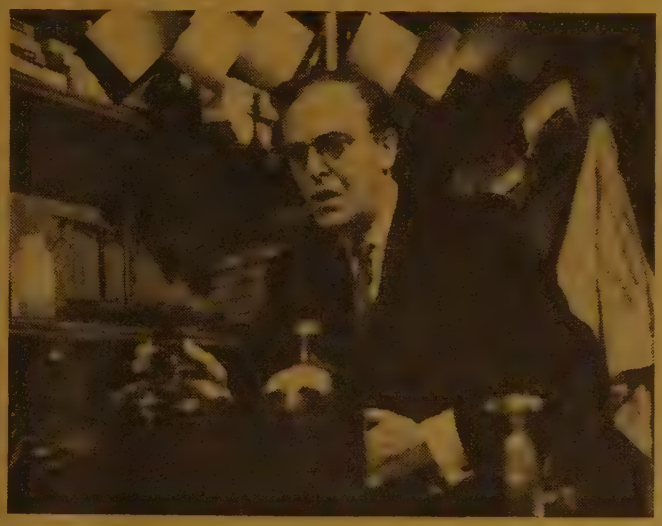
In *Return to the Sea* (July 12) he has recalled from their separate ways Penelope and Tony, the husband and wife who parted at the end of *A Glimpse of the Sea*. They meet again in the same hotel and immediately return to quarrelling. This time, however, the disagreements no longer appear as the natural exasperations of two essentially decent people. The misunderstandings and sudden losses of control fail to make us catch our breath as at two people unaware that they are on the verge of a precipice. They, and we, have been there before.

My impression was that Mr. Hall had no real further use for the couple. For him they had served their purpose; he would, then, have been well advised to forget them since he

'The Brains Trust' on July 14; with, left to right, Professor A. J. Ayer, Professor Eugene Rostow, Dr. J. H. Plumb, M. Paul-Marc Henry, and the chairman, Mr. Norman Fisher

Susannah York as Martine Herrault and Robert Harris as Barrança in *The Richest Man in the World*

ll Bennett as Penelope Belford in *Return to the Sea*



Kenneth Griffith as Harry the photographer in *You're a Long Time Dead*

eemed incapable of imbuing hem with either ideas or dia- ogue of sufficient edge to nerit them a second hearing. Moreover in the exercise he ad arranged for their benefit, heir movements were severely ircumscribed. Whatever per- nutations these warring lovers vent through, they were ound to link in the end. I lon't for the life of me see ow they could have parted or a second time without the ituation dissolving into arce. As Penelope, Miss Jill Bennett was once again first lass, her features reflecting er emotions as rapidly as a haken kaleidoscope, her en- hanting smile warming with ts quality of fun. As the more taid Tony, Mr. Paul Dane- an had a much less rewarding part and ppeared conscious of it.

Cinderella's popularity, on the other hand, is uch that authors are always happy to rewrite er fable. Mr. Warner Law placed his against a ented Mediterranean background, and *The ichest Man in the World* (July 14) was in con- equence an agreeably narcotic trifle. The sun- renched sets, the *boucherie* with sausages dangle, the vine-covered arbours, the serene rrace—the whole holiday atmosphere allowed s to dream idly as we watched this stylish, well- cted production.

Poverty-stricken Martine, beautiful and seduc- ve, was fully conscious of life's gifts to her. When the R.M.W., played by Mr. Robert Harris ith perky testiness, hove into port she needed ttle persuasion from Auntie (another of Miss lermione Baddeley's raddled, lower-class oluptuaries) into setting her cap. The whole ufflé depended for lightness, sweetness, and xture on Miss Susannah York's Martine, and he confected it triumphantly under the skilful irection of Mr. George R. Foa.

To open television's summer season of revivals Miss Elaine Morgan's tense thriller *You're a ong Time Dead*, first seen two years ago, was epeated on July 17. Although her framework is mited—it is virtually the bare but all-sufficing iangle—by adept deployment of narrative skill, undant characterization, and the placing of her eople in recognizable social milieux, Miss Morgan wrote a thriller with depth as well as ace.

Poisoning holds a lure all its own, perhaps because it is the most cowardly form of murder and one we all think we might make a go of. Here a hallucinatory quality gave a special effect to the common man's crime, and as the neurotic husband's imagination bounded out of his reach and the most desperate remedies became plausible, illusion and reality shaded in and out of each other at Miss Morgan's expert manipulation.

The direction, spirited in the main, was over-endowed at times with heavenly voices and echo effects, and the would-be poisoner of Mr. Kenneth Griffith was allowed to be far too nervy and ill-at-ease.

The Langham Group on the previous evening screened a more pedestrian secret-agent thriller for 'Saturday Playhouse'. *On the Edge* by Mr. John Wiles was adapted from the true-life story *Pimpernel in Prague* and trafficked in the terrible human drama of smuggling civilians from behind the Iron Curtain. Competently constructed and briskly performed, it gained its principal effects of tension from actions external to the plot: no doubt, though, it would be just these actions, seen slightly out of focus and in strange surroundings, which would strike as sinister the ordinary citizen unwillingly involved in exceptional events. Mr. Sebastian Shaw played the central character with bluff sensibleness.

ANTHONY COOKMAN, JNR.

Scene from the Langham Group production of *On the Edge* with (left to right) Al Mulock as Captain Kingsley, Sebastian Shaw as Donald Campbell-Shaw, and Jozef Bzowski as a refugee

Sound Broadcasting

DRAMA

Black Endearments

IT IS A PITY that one cannot hear *All For Love* (Third, Friday) without being keenly conscious of Shakespeare most of the time. I don't mean simply that comparison with *Antony and Cleopatra* is inevitable; Dryden's play is utterly different and he 'borrows' and alters with something like Shakespeare's own sublime unconcern. I *would* like to know why he rewrote Charmian's

> It is well done, and fitting for a princess
> Descended of so many royal kings.

as:

> Yes, 'tis well done, and like a queen, the last
> Of her great race: I follow her.

And it would be pleasant to know why he made such a strange change in purpose and point of his version of Enobarbus's great scene-painting set-piece. But it is futile to conjecture.

The echoes which I caught most clearly came from *Macbeth, Julius Caesar, Hamlet,* and *Lear* more than from *Antony and Cleopatra.* They were from the Shakespeare who used simple common speech for crises rather than from the master of magic incantations. The problem of the theme is that the dotage of the general and what Octavia calls 'those black endearments' of Cleopatra involve the political fate of the whole world and the play must be about crumbling empires and mutinous armies as well as the loves of the great. Dryden's simplifications for the

observance of the unities led him to emphasize the internal or psychological drama. But in the same process he was forced to make more important and more active the friends and advisers of his hero and heroine.

R. D. Smith's production economically used music for processional dignity but otherwise kept rhetoric on a rational human-sized level. The verse was neither sung nor shattered into prose. Valerie Hanson as Cleopatra and Leo McKern as Marc Anthony intelligently managed the complexities of this abnormally intelligent play—whose most melodramatic line is its title. Baliol Holloway was excellent as Ventidius, the Roman of antique virtue, and the advisers, plotters, and voices of the world—Alexas (Edward Burnham), Dolabella (David March), and Serapion (Godfrey Kenton)—were all of proper stature and clarity.

The regularity of the serial play adapted from a novel is part of its attraction. Listeners find the next instalment a comforting fixed point in time, friendly like a familiar piece of furniture and mildly compelling like an incomplete pattern or an unfinished tune. The compulsion need not be bullying as it is in 'cliff-hangers'; indeed when a serial 'demands' that you must miss no section of its plot the pressure can work in reverse.

I have been finding 'The Return of the Native' (Home Service) worth attention on Sunday evenings. Thomas Hardy does not suffer from the division into instalments. After all, novelists of his generation were accustomed to being first published in monthly or weekly parts, and there is doubtless a thesis extant on the effects on their narrative method of the words 'To be continued in our next'. The atmosphere of Egdon Heath is well recreated weekly by music, wind and accents, and the competition in amorous motivation between romantic curiosity, kindness, and the need to preserve reputation is well balanced. Eustacia (Jennifer Hales) sounds beautiful and a likely witch and Thomasin (Pat Pleasance) suffers repeated misfortune without seeming merely feeble. The morals of the story are strange enough in themselves, and I wondered how they would be understood by a generation neither shocked nor overawed by Hardy nor confused by having been made to read him. A young second opinion is that the whole thing is a little confusing, but fascinating —'all that wind'—and not to be missed as 'part of Sunday supper'. Which should gratify producer Brandon Acton-Bond and adapter Frederick Bradnum.

Of the kidnapping, blackmail, and murder which are afternoon or Saturday-night summer fare I found *The Gimmick* by Leslie Gillett, produced by W. Glen-Doepel (Home, July 16) most satisfyingly scaring. *Black Death* by Anthony Gilbert (Home, July 16) must belong to some convention that I have not learnt yet. It began with a blackmailer introducing a group of his victims to each other for no explicable reason, and became less probable from then on. *Puzzle for Poppy* (Light, July 12) had the invisible murderer being a butcher instead of a postman, which makes a slight change.

Among frivolities I persist in recommending *Something to Shout About*, but urge the management to fire its present audible audience whose anxiety to oblige is more dreadful than its incomprehension. *Holiday Music-Hall* (Home Service, July 16) had two very good turns in its mixture—Miriam Karlin as an embattled British Waitress and Mr. Askey as himself—and was cunningly conducted by Cyril Fletcher.

FREDERICK LAWS

THE SPOKEN WORD

Only One Bright Period

SOUND BROADCASTING, like the weather, has its dull periods; and, like the barometer on the Air Ministry roof, the honest critic is obliged to record them. The programmes I heard last week were generally uninspiring, and I can record only one bright interval.

I had looked forward eagerly to the latest 'Frankly Speaking' (Home Service, July 12); and I was not disappointed. Dame Flora Robson, questioned by John Freeman and Philip Hope-Wallace, gave a performance of touching honesty. She was picked for the stage (the converse of the usual story) by her father; and from the age of five she was destined for a profession which she saw through decidedly starry eyes.

'I thought,' said Dame Flora, 'that actresses lay on lovely day-beds all the time, and wore trains, and hats in the house, and went to the theatre in a carriage'. And though experience had taught her that the theatre was demanding ('I do regret never having a holiday'), the sound of the orchestra tuning up still gave her the greatest pleasure in the world. Acting, as Dame Flora saw it, was precision work which did not allow a hair's breadth of error; but it was also an outlet for genuine emotion, and 'I've always had this tremendous lot of emotion to give'.

A good deal of this emotion comes across in a broadcast, and Dame Flora's voice is one of extraordinary sympathy and distinction. What struck me most in her talk was her modesty: 'When I go on holiday, I never tell people I'm an actress. I want them to like me for myself'. I was also struck by Mr. Freeman: I do think that, just this once, he might have shown a vestige of chivalry.

Dame Flora never wanted to retire; but, alas, there are many professions in which one has to give a last performance. And since the B.B.C. takes its social responsibilities very seriously (witness the recent differences of opinion about its field sports policy), we were given 'Three Score—and then?' (Home, July 13). This was a useful and comprehensive if sober discussion. Four experts agreed that one should begin to plan for retirement at the age of fifty; and they indicated some of the difficulties of retiring. Occasionally, or so it seemed, industrial firms gave preparatory courses on problems of health and nutrition, and what to do with leisure; but for every firm who did so, there were others who considered that it was impertinence to invade the psychological life of their employees.

There is certainly much to be said in favour of slow acclimatization rather than the sudden presentation of the inscribed clock. But several questions proved perturbing: was it really true that one was too old at forty to start again? Was continuing employment really a mirage? Did most people really embark upon retirement with 'grossly impaired health'? And what of those whose work was intellectual rather than physical? They were not considered at all. None the less, two or three conclusions emerged from this highly practical survey: we were not yet doing enough to ease the transition from work to retirement. The retiring age should be a little more flexible, and since, as Sir Winston Churchill said, leisure is a change of occupation, people should be given 'as many strings to their bow as the bow would stand'. They should be helped to keep their sense of significance; and, as one speaker wisely put it, the attitude of society should be changed. We should remember that people were not young, middle-aged, or old: they were, first and foremost, people.

This was a programme about the future; Mr. Graham Hough looked back, and his appreciation of John Crowe Ransom, if it was somewhat *recherché*, was nicely enough presented (Third Programme, July 11). Mr. Hough did make his point: that this poet, born in 1888 in Tennessee, has something in common with the poet who was born in 1621. This 'Marvell of the Deep South', this purely lyric poet, who writes small-scale poetry, and has only published three volumes of verse, does in some ways sound like a belated seventeenth-century writer. (In certain ways he sounds even earlier, for his themes recall those of Ronsard and Du Bellay.) But can we yet judge his status? Will the future really read him, 'page by page, with Campion and Marvell'? Or will he be solely remembered as the inventor of the 'new criticism'?

It is an excellent thing to broadcast poetry at peak listening hours, and I am all for personal anthologies. Why shouldn't we have our desert island dactyls? But Sir Francis Meynell's programme (Home, July 10) was, to my mind, little short of disastrous. It sounded like getting-as-many-poets-into-half-an-hour-as-one-possibly-could; and no one could properly introduce and read four poets in the space of thirty minutes. As for 'the lovely that are not beloved', were T. E. Brown and Edna St. Vincent Millay really worth consideration? How could anyone write poetry about 'silly sneezes' and 'the flies on the lily pool'? Give me Ella Wheeler Wilcox every time.

JOANNA RICHARDSON

MUSIC

The Music of the Spheres?

THE TROUBLE about music that deliberately sets out to depict or suggest the wonder or awe aroused in the mind by the contemplation of the movements of heavenly bodies, or by reflection on the mysteries of the universe, is that there is no guarantee whatsoever, music being an essentially subjective art, that the composer's attempt to translate into auditive symbols his own private intellectual or spiritual reactions will succeed in arousing anything like the same reactions in the minds of his hearers. There is no vocabulary in music with fixed connotations, as in literature or even the plastic arts, which guarantees that certain sounds will produce certain images in the hearer's mind, or even suggest to him the nature of the emotion or impression experienced by the composer.

Hence, when writing music intended to be descriptive—'programme music' as it is called —composers invariably attach a label of some kind explaining what their intentions are. Otherwise a 'shipwreck at sea', for example, might easily be mistaken for, say, an avalanche or an earthquake. Music is, in fact, incapable of depicting anything precisely; its creator, therefore, can hope to arouse in the listener, at best, feelings or sensations bearing only an approximate resemblance to his own, even when he takes the trouble to explain what he is trying to do.

These reflections were inspired by listening to the broadcast from the Cheltenham Festival (Third Programme, July 14) of the first performance of a symphonic work by Reginald Smith Brindle entitled *Cosmos*. The composer, in a preliminary talk about his work, made some rather sweeping claims about its originality and scope which I am afraid were not wholly borne out in the event. It is perhaps being over-ambitious to attempt in terms of music to depict 'the mystery of infinity', 'the microcosmos of molecular structure and minute bodies', 'the macrocosmos of unformed galaxies of giant stars', and, finally, 'the spiritual force of the

cosmos'. Neither physics nor metaphysics (and the above schema includes both) are subjects that really lend themselves to musical treatment; and when composers deliberately set out to be awe-inspiring and impressive the results are not always what they would have wished.

Scriabin is a case in point: the enormous canvases of his *Divine Poem* and *Poem of Ecstasy* are so overloaded with emotion and feverish would-be spiritual exaltation that they defeat their own end; they do protest too much. Then, again, the actual sounds used to suggest infinity and the mysteries of the universe can easily be misinterpreted so that, unless the hearer is forewarned, and knows what the composer is trying to say, a passage, as in Mr. Smith Brindle's work, intended to conjure up a picture of 'giant stars hurtling through the firmament' *might* suggest nothing more than, say, trains shunting or a dynamo at work. Ultimate mysteries of life and death, I have always thought, can generally be better expressed in the 'still, small voice' of understatement. That is why a Mozart slow movement, for example, or a few magical bars in *Pelléas et Mélisande* can bring one nearer to communing with the infinite than any amount of highly organized tonal or atonal manipulations of sound-masses, complete with vibraphones and all the paraphernalia of the modern orchestra.

All this does not mean that I failed to see any merit in Mr. Smith Brindle's cosmological adventure. On the contrary, there was much in the music that I found intriguing and suggestive, including some fascinating new sonorities —though I doubt whether the saxophone is really a mystical instrument—and a high seriousness of purpose untainted by any suspicion of meretriciousness or seeking after effects, which after all is only what one would expect from a distinguished pupil of Dallapiccola. But I still think the composer was over-ambitious in his aims, and it is therefore not surprising that *Cosmos*, in the last resort, failed in its overall purpose, though having many qualities to commend it, perhaps on a less exalted plane than that to which its creator aspired.

In the meantime listeners at home have had another opportunity of hearing Benjamin Britten's new opera, thanks to the broadcast of the recording of the original Aldeburgh production of *A Midsummer Night's Dream* (Third, July 17). This almost coincided with the first performance of the opera abroad, which took place at the Holland Festival last week. It will be heard again in German at Hamburg before coming to Covent Garden next season, where it will be given with a large, instead of a chamber, orchestra. The music in the original version certainly lends itself to broadcasting better than that of most operas, perhaps because of the clarity of its texture and very distinctive vocal line. The prevalence of high voices and the use of a boys', instead of a mixed, chorus also give the music a special flavour of its own.

ROLLO H. MYERS

Alessandro Scarlatti and the Chamber Cantata

By SCOTT GODDARD

The first of two programmes of Scarlatti's cantatas will be broadcast at 9.20 p.m. on Tuesday, July 26 (Third)

IT IS INEVITABLY to Edward J. Dent that we turn for information about the seventeenth-century chamber cantata in Italy in general and the hundreds of works of this character written by Alessandro Scarlatti in particular. His study of this composer, published more than fifty years ago and recently reissued*, remains the standard source, and on this subject nothing could be more illuminating than a quotation from the book:

> The voice was the only instrument for which chamber music of a really advanced type could be written before Corelli and his school had shown that from a purely musical point of view the violin could do as much as the voice and a good deal more; it was the only instrument which combined a finished technique with the greatest variety of beautiful tone-colour and which in the majority of cases was governed by minds of a high order of intelligence. . . . Under these circumstances it need not surprise us to find that at the end of the seventeenth century the chamber cantata was at the climax of its excellence and popularity among serious lovers of music in Italy; indeed, it is to the seventeenth century what the violin sonata is to the nineteenth. Alessandro Scarlatti is at once its greatest and most fertile exponent. His extant cantatas . . . are of special importance, because they always represent the composer in earnest. Some are dull, but not one is trivial or vulgar; many are of great beauty, and the majority of them are deeply interesting as studies in composition.

And, we may add, most of these works are unknown to any but expert researchers.

Scanty Celebration

During this current year we have been rather scantily celebrating the tercentenary of the birth of Alessandro Scarlatti (1660-1725) and in general have treated the occasion with more piety than enthusiasm. There has been also a vague, minute sensation of guilt, a feeling that in neglecting the music of this great craftsman we rob ourselves of a valuable and rewarding experience. Those 500 solo cantatas: surely when the dull works have been subtracted there must be a mine of beauty that we ought to persuade singers and instrumentalists to display for our interest.

The two forthcoming broadcasts will provide just such an opportunity for listeners to get close to Scarlatti and in reassessing his work to see if there is not something there that can become a permanent contribution to a serious music lover's accepted aesthetic resources. The solo cantatas which, with a number of arias taken from other cantatas, as well as the serenata *Venere e Amore* written in Naples probably between 1695 and 1700, are all admirable, and in one case amusing, examples of his art in this particular sphere of vocal music which he cultivated extensively with a masterly and highly individual touch. In the list of his compositions the cantatas, for one or for two voices accompanied either by continuo alone or with other instruments, are by far the most numerous. Next come the operas, then the oratorios, motets and masses, and lastly a handful of madrigals and chamber music.

It is not merely because the chamber cantatas overtop the rest in numbers that this aspect of Scarlatti's art deserves special attention. Hampered they are, to twentieth-century ears, by their texts. Yet the variety of the music, the abundance of Scarlatti's invention and his subtle insight into the lyric, dramatic and comic aspects of the scenes, all that side of the chamber cantatas gives them lasting value and perennial interest. These three fundamental types of inspiration in the cantatas are represented in the two programmes: the lyric type by the soprano aria, with its preceding recitative, 'Lontan da la sua Clori' from the cantata of that name, a smooth, melodious movement with something of a prophetic Handelian outline of phrase and rhythmic pulse. A similar lyric quality is in the tenor aria 'Dimmi qual prova mai' from the cantata *Dal bel volto d'Irene*. Both arias would have been apt for the more light-hearted weekly concerts given by Cardinal Pietro Ottoboni in Rome, gatherings at which Scarlatti's cantatas were much in demand.

More intense is a spirited, boldly rhythmic soprano aria 'Uccidetelo, divoratelo furie barbare' from the cantata *Tutto acceso a quei rai*; here the energetic solo music, endowed with a splendid forward thrust, is set above an instrumental bass that matches it in variety and power.

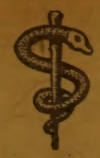
The comic element can be heard in the tenor cantata *Per un vago desire Tirso a Clori insegno musica un dì*. This is the ageless story of the libidinous music master (women seem to be exempt at that end of the tale of years in this particular situation as do boys at the other) teaching his girl pupil what he feels she should know about music. We catch the tale as it passes through Scarlatti's mind on its way to Rossini's. The entertainment here consists in the fact that the lesson deals with solfeggio, so that play is made with do, re, and so forth and a phrase such as 'la sol mi rendo' is cunningly manipulated in accordance with the appropriate solfeggio positions of the syllables; by which time the little comedy has degenerated into maudlin love-sickness and the cantata ends in sighs, the teacher now hopelessly given over to the raptures of sophisticated affection.

Continuing Influence

With Alessandro Scarlatti the chamber cantata reached a climax it was destined never again to attain even with Handel. The dice were too heavily loaded against this type of work by the rise of instrumental virtuosity and the resultant music. Nevertheless, although moribund, the chamber cantata continued to exert influence. For long considered, when thought of at all, as a museum piece, it was never wholly to be laid aside. The notion that a single voice or a duet with chamber orchestral accompaniment or simple continuo would be able to express adequately passion, tenderness, pity, tragic involvement as insistently as any music of the operatic stage never escaped the notice of the more subtle creative musicians. It is not too much, for instance, to suggest that the concert arias and scenas of Mozart are descendants of Scarlatti's cantatas. From that it is but a step to Beethoven's 'Ah! perfido'.

To this day the influence and example exist. Britten's three canticles are witness of that. 'Still falls the rain' is of necessity far removed from any text Scarlatti faced but the musical framework is not so far from his idea of the dramatic capacities of a solo voice raised in anguished comment, supported by a continuo, its parts now made fully explicit, the whole capable of expressing the deepest imaginable feeling about life and its tragic texture.

* *Alessandro Scarlatti: his life and work.* Arnold. 30s.



'A SILENT TRUMPET'

By PODALIRIUS

Advertising is lies. We all know that now, and a few politicians know it better than the rest of us. No wonder that committees are always being set up to plumb the depths of advertising mendacity, or that their soundings are widely publicised. Why, even this column is, I understand, the harbinger of an advertisement, and so might be worth investigating for unBritish leanings. Meanwhile, it should certainly be taken with a large pinch of salt.

No pinches of salt, though, for politics, which is not a business but an art—the art of the possible. Art is, we all recognise, always crammed with as much truth as can be got into it. Young artists—and therefore presumably young politicians—starve, while cramming, in attics. Whether they starve in them because they tell the truth or *vice versa* one is never sure.

Art, that cornucopia of truth, is, however, but one element in our definition of politics. The other element, 'of the possible', does carry undertones. Not 'of the desirable' or 'the ideal', but of the merely possible.

Well, to get down to earth, certain politicians do keep telling us that the NHS drug bill is too high; it simply lines the pockets of the wicked drug manufacturers, to whose advertising most of the trouble is due. Less publicised than this wholesome expression of opinion is the recently announced fact that in 1957/58 the average hospital bed cost £22 per week, and that to this sum drug costs contributed 14s. 9d.

The final report of the Hinchliffe Committee on prescribing costs speaks of 'the totally inadequate publicity given to the remarkable saving in life, improvement in health, increase in efficiency, and saving on expensive institutional treatment which all stem from, among other things, the use of new drugs'. Will that same vocal handful of politicians now tellingly publicise them? You may ask why the drug manufacturers, those adepts at advertising and publicity, have not already done so. Good taste apart, could they perhaps, being in the thick of the battle for new drugs, have felt that some victories are so clear they need no trumpets? And why, in any case, waste breath blowing on a trumpet while others publicise their view that all one's notes are false? Oh, do pass that salt, somebody.

* * *

Well played, Podalirius! The notes, from your trumpet at least, ring out clear and true. Newly discovered drugs are certainly working wonders. But luckily for most of us there is seldom the need to call on them for our general good health—even though our present-day diet can easily lack nutrients vital to our well-being. For we can make up common nutritional deficiencies simply and pleasantly with Bemax. Why Bemax? Because it's stabilised wheat germ—the richest natural vitamin-protein-mineral supplement known to man. It contains high concentration of the B-complex, approximately 27% protein (as much as lean beef) and generous amounts of iron. Try sprinkling a little Bemax on your fruit or breakfast cereal each day. You can get it from chemists.

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Broadcast Suggestions for the Housewife

Herbs and Spices

THE SECRET of using herbs and spices is not to make the dish taste and smell overwhelmingly of them, but to use them so as to bring out the true flavours that are there. A green salad with the slightest suspicion of garlic added will bring out the life in lettuce and flavour in cucumber; mint added to new potatoes and to green peas will give them a garden freshness—or, if they are garden fresh, will accentuate it.

Sodium glutomate, which is available under proprietary names in many shops, sprinkled lightly over meat will stress the flavour and quality of the meat without adding a foreign flavour. Whenever I cook steaks I melt a little butter and add to it some garlic salt and paprika. I pour a little of this over one side of the steak and then put it under the grill. When this side is sufficiently grilled to be sealed I turn it over, pour the rest of the melted butter on it, and grill until sealed. Then I turn the steak again, finish the first side, and then turn and finish the other side. The flavour of the butter mixture penetrates the steak and leaves a delicious gravy.

I have found that keeping in the house a stock of herbs and spices in dried and powdered form is a valuable asset. It means I can add a little rosemary (as well as garlic) to my salads; I can liven up carrots with marjoram; I can make a cheese sauce tastier by adding a pinch or two of ground onion, and so on. But remember—Oscar Wilde said that the epigram should be the spice of literary composition and not the meat. In the same way spice should be the wit and not the subject matter of a dish.

CHRISTOPHER FLORIS
—'Today' (Home Service)

Raspberry Soufflé

Using 1 lb. of raspberries you can make a raspberry soufflé by softening 1 dessertspoon of gelatine in 3 tablespoons of cold water for 5 minutes, then stirring it into a raspberry jelly made with ½ pint of boiling water. Rub ½ lb. of raspberries through a sieve, and stir into the jelly mixture. Whisk the juice of half a lemon with a medium-sized tin of evaporated milk, which must be cold, and when the raspberry mixture is beginning to thicken fold in the whipped milk and then 2 stiffly beaten egg whites. Pour into a rinsed mould, and serve with the rest of the raspberries as decoration.

ANNE WILD
—'Shopping List' (Home Service)

Blackcurrant Purée

Wash and string the blackcurrants. Remove the trivet from the pressure cooker, put in half a pint of water for every 2 lb. of prepared fruit, taking care that the cooker is not more than half full. Bring to 15 lb. pressure and cook for three minutes. Allow the pressure to reduce at room temperature. Put the fruit through a fine sieve, and return to the cooker with enough sugar to sweeten, and stir over a low heat until the sugar is dissolved. When it is cold this purée can be used for summer trifles, as a sauce for ice creams, or for fruit drinks. Remember that it will not keep indefinitely.

ANNE WILD
—'Shopping List' (Home Service)

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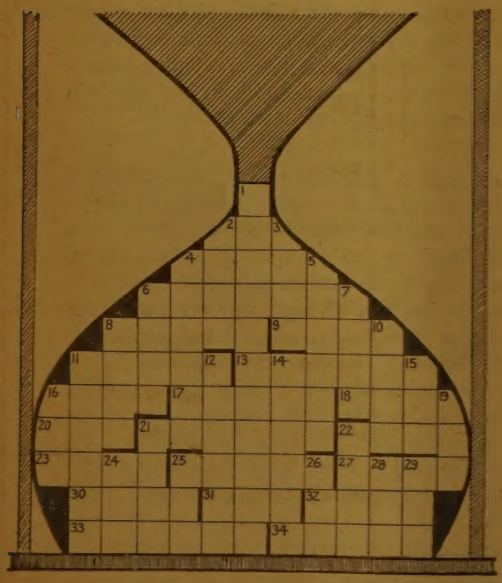
Crossword No. 1,573. Hour-glass—IV. By Zander

Prizes (for the first three correct solutions opened): book tokens value 30s., 21s., and 12s. 6d. respectively

Closing date: first post on Thursday, July 28. Entries should be on the printed diagram and envelopes containing them should be addressed to the Editor of THE LISTENER, 35 Marylebone High Street, London, W.1, marked 'Crossword' in the left-hand top corner. In all matters connected with the crosswords the Editor's decision is final



NAME.....

ADDRESS.....

The diagram represents the lower half of an hour-glass, each space being one grain of sand. These grains originally formed part of a seventeenth-century poem; but now, after many revolutions, the across lights have become entirely different words, and the down lights (except **1D**) are jumbles of words. Two 'jumbles' happen also to be words. **1D** is an appropriate phrase from the quotation, the ninety-seven letters of which may be found useful for checking purposes.

CLUES—ACROSS

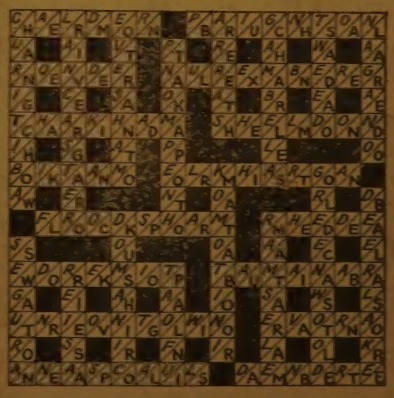
(Each line of doggerel contains both a one-word definition and the consecutively jumbled letters of the light. Definitions and jumbles do not overlap. Punctuation should be ignored.)

2. Said the coach, rather rudely, from pique, (3)
4. 'Like a woman you row—very weak'. (5)
6. On whom Blue, showing guts, (7)
8. Unleashed bones, kicks, and butts— (5)
9. Now they've got to *restrain* his physique! (4)
11. Quoth the napkin to the tea-pot lid: 'Young shaver, (5)
13. As you pour tea in mixed company—a favour! (6)
16. Leftward turn, control your breathing (4)
17. To libate, when liquid's seething, (5)
18. While the tops of legs I guard, and never waver'. (4)
20. When my lady, on Whit Monday, went off duty (3)
21. For a respite, primed with ale, I'd find her snooty— (6)
22. Not so hot! But by Whit Friday (4)
23. Off the lift she'd trip, all tidy, (4)
25. Dressed in satin, not a slattern but a cutie. (5)
27. Over crags I tore, through ridges, and I swam; (4)
30. Undeterred, I spread the message of Islam, (4)
31. Taught witch doctors, dined with Gandhi, (3)
32. Lived on shrub, tobacco, brandy— (4)
33. And they all said, 'What a wag you are—now scram! (6, two words)
34. Hello there, solver! Frowns? Why don't you try the Downs? (5)

DOWN

1. *See preamble* (11, three words)
2. Rent advanced by a thousand (4)
3. Red leader of Liberals caught in flight (4)
4. With the sun not fully visible, lift your hat, and reveal no more! (6)
5. We locked in the parrot—it's scowling (6)
6. Stale joint put on fire by head of household (4)
7. Vulpine fangs may be excavated in rock-cavities (4)
8. A Shetland magistrate can get drunk as well as a copper (4)
10. Love leads to confusion for a painter (4)
11. Excessive fondness for the rabble apparent in the female (6)
12. Heartless lad takes father on the endless indirect route (6)
14. For Mohammed's flight, he wants a frolic on the way up (6)
15. I shall be jittery in the gulley (3)
16. Wykehamists' opening pair stay about an hour—for what? (3)
19. Fit to be a candidate in the University (3)
21. Scots pinch and flog Oriental (4)
22. What a lovely summer used to be once, relative to the top of the thermometer! (4)
24. One who's apt to provoke rising of English (3)
25. A sore place that has no dressing on it (3)
26. The right to hold court is typical of fashionable circles—not half! (3)
28. Get the old bag to poke fun at the fellow (3)
29. Any provincial song-bird is uncanny! (3)

Solution of No. 1,571



1st prize: E. C. Hunt (Great Yarmouth); 2nd prize: Miss J. Forbes (Bromley); 3rd prize: C. Allen (Southsea)

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